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BROOKLYN ENTOMOLOGICAL SOCIETY

NEW SERIES

Vol. XXII 1927

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EUGEREON AND THE ANCESTRY OF THE HEMIPTERA, PSOCIDS AND HYMENOPTERA.

By G. C. Crampton, Ph.D., Massachusetts Agricultural College,
Amherst, Mass.

Many recent investigators such as Handlirsch,[1] 1925, and Karny,[2] 1925, still maintain the old mistaken view that *Eugereon* represents a type of insect ancestral to the Hemiptera (*i.e.,* Homoptera and Heteroptera). The Hemipterists with whom I have discussed the matter, however, have been very skeptical as to the existence of any close relationship between *Eugereon* and the Hemiptera, and Mr. de la Torre-Bueno, who has very kindly allowed me to look over his notes upon the subject, has suggested that I summarize the objections to the derivation of the Hemiptera from *Eugereon,* based upon anatomical grounds.

It should be borne in mind that only a fragment of one specimen of *Eugereon* is known, and this fossil imprint shows only a portion of the head structures, parts of the legs, the basal portion alone in the wings, and indistinct traces of the outlines of the thoracic segments, so that in the following discussion it will be necessary to limit ourselves to the consideration of the parts which can actually be seen in the original specimen, instead of drawing any conclusions from Handlirsch's restoration (of the entire insect) in which the substitutions of the missing parts are purely imaginary, and in many instances seem to have been added with a view to giving the insect a Hemipteroid appearance. Taking up each of the known structures of *Eugereon* separately, I would point out that none of the important details are Hemipteroid, but, on the contrary, these details clearly indicate that *Eugereon* is merely a highly modified offshoot of the Palaeodictyoptera developing along lines which lead away from the condition typical of the ancestors of the Hemiptera and all of their Neopterygotan relatives (*i.e.,* the insects which are able to lay the wings along the top of the abdomen in repose).

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[1] Schroeder's Handbuch der Entomologie, Bd. III.

[2] Handbuch der biologischen Arbeitsmethoden, Abt. IX (Die Methoden der phylogenetischen Forschung).

In the head region of *Eugereon* (Fig. 1) the elongated mouthparts project forward like those of primitive Diptera such as *Geranomyia,* instead of being directed downward, as the condition exhibited by the most primitive representatives of the Hemiptera would suggest was the case in the ancestors of the Hemiptera. According to Brongniart,[3] 1893 (though disputed by Handlirsch, 1909), greatly elongated, forward-projecting mouthparts of a type very suggestive of those of *Eugereon* occur in Palaeodictyoptera (Fig. 2), and since all of the structures of *Eugereon* are built upon a Palaeodictyopteroid plan, it is merely to be expected that the mouthparts of *Eugereon* will also resemble those of the Palaeodictyoptera in question. When we make a detailed comparison of the mouthparts of *Eugereon* with those of the Hemiptera, however, we find them to be built upon an entirely different plan from those of the Hemiptera, and they apparently lead off in a direction directly opposite to that followed by the precursors of the Hemiptera in developing the Hemipterous type of mouthparts.

In Hemiptera there are scarcely any recognizable traces of the maxillary palpi, even in the most primitive representatives of the order, so that it is surely reasonable to maintain that the ancestors of the Hemiptera must have exhibited a tendency toward the *reduction* of the maxillary palpi; and if it can be shown that *Eugereon* exhibits the exactly opposite tendency, namely, an *overdevelopment* of the maxillary palpi, one can hardly maintain that *Eugereon* is a suitable ancestral type for the Hemiptera in this respect! It is well known that primitive insects have only *five* segments in the maxillary palpi, but *Eugereon* exceeds even these primitive insects in the development of its maxillary palpi, since the maxillary palpi of *Eugereon* (*mp* of Fig. 1) consist of *seven* segments, so that in this over-development of the maxillary palpi *Eugereon* is entirely different from the types ancestral to the Hemiptera—which must have had reduced, instead of over-developed, maxillary palpi.

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[3] Insectes fossiles des Temps primaires.

It must be remembered that the maxillary palpi of insects are frequently apparently composed of *seven* segments like those of *Eugereon* (*mp* of Fig. 1), whereas the labial palpi of adult insects are composed of only *three* segments (or in rare instances apparently four segments are present when the palpigers take on the appearance of a fourth segment of the labial palpi) and the labial palpi of these insects are never composed of seven segments, as is the case with the structures in question in *Eugereon,* so that there is no escape from the conclusion that the structures labelled *mp* in Fig. 1 of *Eugereon* do not represent labial palpi as Handlirsch maintains, but they do apparently represent maxillary palpi (from the number of segments composing them), which occupy a similar position in Diptera[4] and other insects with greatly elongated mouthparts, and they resemble the maxillary palpi of such insects very markedly in outline, and other features as well. Furthermore, the structures labelled *mg* in Fig. 1 are probably the greatly elongated galeae of the maxillae instead of representing the entire maxilla, as is indicated by the condition exhibited by insects with similarly elongated maxillae. On the other hand, there is no indication of the presence in *Eugereon* of a sunken type of maxillary seta borne on a lateral portion of the mouth-part area as in *Hemiptera;* and all of these features in *Eugereon* are apparently of a type very different from that exhibited by the Hemiptera.

Typical Hemiptera have a stout beak (Fig. 4) composed of the parts of the labium, which surpasses the other mouthparts in bulk; and it is certainly very reasonable to suppose that the true

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[4] It should be noted that these maxillary palpi are borne *laterally,* exactly as in Diptera and other insects with maxillary palpi of this type, whereas if the structures in question represented labial palpi instead, they would be borne on a well-developed, unpaired, median basal sclerite, the mentum, which bears the palpigers and labial palpi in all insects. Judging from the condition exhibited by the labium of all Hemiptera, such a median unpaired basal sclerite must have been large and well developed and elongated in their ancestors, so that the supposed labial palpi of *Eugereon* do not fulfil the conditions demanded for the ancestors of the Hemiptera, nor do they correspond in position or segmentation to the labial palpi of other insects, and must therefore represent the maxillary palpi with which they agree in position, segmentation, and all other features.

ancestors of the Hemiptera had an extremely well developed labium forming an elongated median structure in which the basal sclerites of the labium were well marked, and the terminal portions of the labium (palpi, etc.) became approximated preparatory to uniting to form the distal segments of the beak in Hemiptera; but *Eugereon* exhibits no well defined structures which fulfil these conditions, and in this respect again, *Eugereon* is not a suitable ancestral type for the Hemiptera. When the maxillary palpi of *Eugereon* are given their correct interpretation, there is no structure left to form a well developed, medianly situated labial structure of the type demanded for the ancestors of the Hemiptera, and this fact surely has some significance in attempting to derive the Hemiptera from *Eugereon*!

While dealing with the subject of the beak of the Hemiptera, I would call attention to the fact that the homologies usually proposed for the segments composing the beak appear to be incorrect. Thus, when we compare the parts of the beak of the Hemipteron shown in Fig. 4 with the parts of the labium of the Dipteron shown in Fig. 3, it is apparent that the closely approximated labial palpi *lp* of Fig. 3 correspond to the united labial palpi *lp* of the Hemipteron shown in Fig. 4, while the palpigers *pg* of Fig. 3 correspond to the palpigers[5] *pg* of Fig. 4, and the mentum *mn* of Fig. 3 corresponds to the mentum *mn* of Fig. 4. The region corresponding to the submentum is membranous in both Figs. 3 and 4, so that the three-segmented beak of the Hemipteron shown in Fig. 4 is obviously composed of the mentum, palpigers and united labial palpi. When the beak is composed of four segments, as in the Hemipteron shown in Fig. 9, the basal segment *mn* evidently represents the mentum *mn* of Figs. 4 and 3, while the next segment *pg* of Fig. 9 represents the united palpigers *pg* of Figs. 4 and 3, and the two distal segments *lp* of Fig. 9 represent the segments of the united labial palpi *lp*[6] of Fig. 3. Traces of the two segments composing the labial palpi

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[5] I would emphasize the fact that the structures labelled *pg* in Fig. 4 are *paired,* and therefore cannot represent the mentum, which is an unpaired sclerite.

[6] As Heymons and others have pointed out, the labial appendages of the Nepidae, etc., do not represent labial palpi, and the structures in question are not borne on the palpigers. as is true of all labial palpi.

are still preserved in the Dipteron shown in Fig. 3, while in other Diptera, such as *Edwardsina,* the two segments are well developed, though in Fig. 3, the two-segmented condition tends to disappear in the closely approximate labial palpi. The reasons for homologizing the parts of the labium of the Dipteron shown in Fig. 3, in the manner indicated by the labelling, are given in a paper on the labium of insects (Proc. Ent. Soc. Washington, 27, 1925, p. 68) and need not be further discussed here.

In comparing the parts of the beak of the Hemipteron shown in Fig. 4 with those of the Dipteron shown in Fig. 3, I would not imply that the Hemiptera and Diptera are at all closely related, but what Nature *has done* at least shows what Nature *can do,* and by comparing the parts of an elongated beak of a Hemipteron with the similarly elongated labium of other insects we can see what Nature has done in producing an elongated type of labium in these other insects, and using the condition exhibited by them as a basis, we can interpret the parts of the Hemipterous labium much more correctly than if we merely guess " in the dark " as most people seem to do in attempting to determine what labial sclerites the segments of the beak represent. In practically every insect I have ever seen, in which the labium becomes long and slender (*e.g.,* fleas, Diptera, Mecoptera, certain Coleoptera, etc.), the submentum becomes greatly reduced or membranous, while the mentum is usually large, the palpigers are well developed, and the ligula (composed of the glossae and paraglossae) disappears as the labial palpi become more closely approximated—and the labial palpi are always the terminal structures to be retained in such cases. From these facts, it is evident that it is much more logical to interpret the segments of the beak of a Hemipteron as the mentum, palpigers, and united labial palpi, than it is to attempt to interpret these segments in any other fashion.

In the figure of the head and mouthparts of *Eugereon* by Handlirsch, 1909 (Die fossilen Insekten), upon which Fig. 1 is based, no antennae are shown, while in the restoration of *Eugereon* by Handlirsch, 1925 (Handbuch der Entomologie, Bd. III), antennae occupy the position of the structures labelled *md* in Fig. 1, and the mandibles are represented as though grouped with the other mouthparts. One might infer from this that the structures labelled *md* in Fig. 1 represent the antennae, and if this is the case, they are wholly different from the antennae of Hemiptera. The structures labelled *md* in Fig. 1, however, look more like mandibles (as Handlirsch intended that they should), if Handlirsch has figured them aright, and this might be taken to indicate that *Eugereon's* slender mandibles are like those of Hemiptera. On the other hand, certain Nematocerous Diptera have slender mandibles of this type also, and the mandibles alone are not sufficient evidence for establishing a relationship between *Eugereon* and the Hemiptera, if other mouthparts such as the maxillary palpi and labium preclude such a relationship, and until it has been definitely determined what the structures labelled *md* in Fig. 1 actually represent, it is futile to speculate as to the affinities they may indicate.

The leg of *Eugereon* (Fig. 1) is extremely like that of the Palaeodictyopteron shown in Fig. 2, as would be expected from the fact that in its other structures also, *Eugereon* is Palaeodictyopteroid. According to Handlirsch, the tarsus of *Eugereon* (Fig. 1) consists of only two segments and a claw. If this is correct, this in itself would preclude our regarding *Eugereon* as the type ancestral to the Hemiptera, since the three-segmented tarsi of Hemiptera can hardly be derived from a type of tarsi composed of only *two* segments, nor can forms having two claws be readily derived from forms having only one, so that here again the evidence is decidedly against regarding *Eugereon* as the type ancestral to Hemiptera!

The pronotum of *Eugereon* (Fig. 1, *pn*) has broad lateral expansions (paranota) very suggestive of those of certain Palaeodictyoptera, which again is in harmony with the view that *Eugereon* is merely a specialized offshoot of the Palaeodictyoptera. On the other hand, the pronotum grows down over the pleural region in an entirely different fashion in all of the Homoptera and other primitive Hemiptera I have seen (see figures of the parts in Trans. Amer. Ent. Society, 52, 1926, p. 199) and the pronotum of *Eugereon* is thus Palaeodictyopteroid, and is not of the type characteristic of the ancestors of the Hemiptera, which apparently had a pronotum like that of leaping Orthoptera, if the condition exhibited by the primitive Hemiptera has any meaning.

The fact that the meso- and metathorax of *Eugereon* are of approximately equal size is another feature indicating a very close relationship between *Eugereon* and the Palaeodictyoptera. Since the two segments are of unequal size in all Hemiptera, and even the most primitive of them show a marked tendency in this direction, this would indicate that the ancestors of the Hemiptera very probably showed indications of a "heteronomous" condition in the thoracic segments. The character of the thorax in general would thus indicate that *Eugereon* is not like the ancestor of the Hemiptera, but is merely a specialized offshoot of the Palaeodictyoptera—as is indicated by its other structures as well.

The wings are the only other features left to be considered, and as I shall point out, the evidence of the wing characters would support the evidence of the other structures of the body in indicating that *Eugereon* is merely a specialized offshoot of the Palaeodictyoptera having nothing to do with the ancestry of the Hemiptera. In the hind wing of *Eugereon* shown in Fig. 7, the anals A are bent sharply backward in a fashion wholly unlike that encountered in the hind wings of any Hemipteron whatsoever, and the only insects I have seen in which the anal veins of the hind wings are of this peculiar type are the Palaeodictyoptera figured by Handlirsch and others. It would be wholly impossible to derive the anals of the hind wings of primitive Hemiptera from such a peculiarly specialized Palaeodictyopteroid type, and this indicates that *Eugereon* is not of a type ancestral to the Hemiptera! Similarly, the peculiar " palmate " type of branching of Cu in the hind wing of *Eugereon* (Fig. 7) is wholly unlike that of the cubital vein of any known Hemipteron, while it approaches the type found in certain Palaeodictyoptera and Protorthoptera. This vein is so peculiarly and highly modified, that it would be quite impossible to derive the cubital veins of the hind wings of the Hemiptera from this type, so that the evidence from this source falls into line with that of the other structures of the body in indicating that *Eugereon* is not ancestral to the Hemiptera, but is merely a specialized offshoot of the Palaeodictyoptera. The crowding of veins M and R into the anterior region of the hind wing of *Eugereon* (Fig. 7) is not the condition one would expect to find in the ancestors of the Hemiptera, and anyone who is familiar with the character of the hind wings of the primitive Hemiptera, as figured by many recent writers, can readily see that the venation of the hind wings of Hemiptera could not be derived from the *Eugereon* type at all, and we must therefore look elsewhere for this ancestral type.

Only the basal part of the fore wing of *Eugereon* (Fig. 5) is known, but the distal portion of the fore wing of *Mesotitan* (Fig. 10) has been figured by Tillyard, 1925 (Proc. Linn. Soc. N. S. W., 1925, p. 374), who regards is as a member of the so-called " Protohemiptera," to which *Eugereon* belongs. In the fore wing of *Mesotitan* (Fig. 10) the elongated, much branched Cu_2, with its pectinate or unilateral type of branching, is surely not suggestive of any Hemipterous type of Cu_2; and Cu_1 which is a simple unbranched vein in the fore wing of *Mesotitan* (Fig. 10) is not like Cu_1 of Hemiptera, since this vein tends to fork in the Hemiptera. Similarly, the branches of media are but two in *Mesotitan,* while in primitive Hemiptera there are four branches of media in the fore wing, and these could not be derived from the *Mesotitan*-type. The branching of the radial sector in the fore wing of *Mesotitan* is likewise of an entirely different type from that of the primitive Hemiptera, and *Mesotitan* therefore seems to belong to an order of insects not ancestral to the Hemiptera at all. The fore wing of *Mesotitan* resembles that of certain Protorthoptera in certain respects, but it does not resemble the Protorthopteroid types which approach the ancestors of the Hemiptera. The character of the distal portion of the wing of the " Protohemipteron " *Mesotitan* therefore adds no evidence whatsoever in support of the view that the members of this order were ancestral to the Hemiptera.

In the basal portion (*i.e.,* all that is preserved) of the fore wing of *Eugereon* (Fig. 5) the character of the anals A is wholly unlike that of the anals of any Hemiptera whatsoever, while it is just like that of the anals of numerous Palaeodictyoptera. Similarly, the character of the branching of Cu in the fore wing of *Eugereon* (Fig. 5) is wholly unlike that of cubitus in any Hemiptera, but is like that of many Palaeodictyoptera. Thus cubitus in *Eugereon* (Fig. 5) throws off an anterior branch and the remaining portion of cubitus then branches again, whereas in the Hemiptera (*e.g.,* Fig. 8) cubitus gives off a branch which arises much nearer the base of the wing (and is hence more primitive than is the case with the anterior branch of Cu in *Eugereon*) and this branch forks, or branches pectinately distally, while the second branch of cubitus does not branch at all in the primitive Hemiptera, thus differing wholly from the type of branching exhibited by cubitus in *Eugereon.* Furthermore, the anals and cubitus are relegated to the posterior region of the fore wing in Hemiptera (Fig. 8) while in *Eugereon* (Fig. 5) they occupy the central portion of the wing and crowd forward the median vein, which occupies the central portion of the wing in Hemiptera (Fig. 8), and the whole character of the venation of the fore wing of *Eugereon* is unlike that one would expect to find in the ancestor of the Hemiptera; and here again the evidence of the venation bears out that from all other parts of the body in indicating that *Eugereon* is not like the ancestor of the Hemiptera in any important feature at all!

The archidictyon (alarete) or primitive meshwork between the principal veins of the wing of *Eugereon* (a portion of this meshwork is shown in Fig. 5) is of the Palaeodictyopterous type, and is not very suggestive of the archidictyon of any known Hemipteron, but this feature is one of no especial importance. The matter of the greatest importance in the wings, however, is the fact that Hemiptera very evidently came from ancestors which were capable of laying the wings flat along the abdomen in repose, or could hold the wings roof-like along the abdomen (as I have pointed out many times before—*e.g.*, Journal of Entomology and Zoology, 1924, p. 33, etc.) whereas *Eugereon* evidently could not do this, and hence does not represent a type ancestral to the Hemiptera, while it is evidently a specialized offshoot of the Palaeodictyoptera which hold their wings outstretched in repose. The method of holding the wings in repose is an extremely important feature in grouping insects according to their origins and natural affinities. On this basis, winged insects are divided into two groups, one, the Archipterygota, or forms which hold their wings outstretched in repose, includes the Palaeodictyoptera, with their early offshoots such as *Eugereon,* the Prodonata with the Odonata, the Protephemerida with the Ephemerida, etc., while the second group or Neopterygota, or forms capable of holding the wings along the abdomen in repose, includes the Hemiptera and their allies, together with the Holometabola, and the forms derived from ancestors such as the Protorthoptera and Protoblattids, which could lay the wings along the top of the abdomen in repose. The Archipterygota have but one, or no alar ossicles (the articulatory plates at the base of the wings), while the Neopterygota have several alar ossicles, and the method of articulation of the wings with the tergal region is very different in the two groups, so that the distinction is a very fundamental one, and cannot be ignored in any phylogenetic studies of this character. Since the wings of Hemiptera[7] were evidently derived from those of an ancestral type exhibiting the feature of laying the wings along the top of the abdomen, or holding them roof-like along the sides of the abdomen, and since there are several alar ossicles at the base of the wings of Hemiptera, as in all other Neopterygota, we must conclude that the Hemiptera could not be derived from a form like *Eugereon,* as is also indicated by every single important feature of *Eugereon's* anatomy. The view that *Eugereon* is ancestral to the Hemiptera is thus not merely unproven, but it is rendered entirely untenable by a careful study of the actual evidence in the matter, so that we are forced to seek elsewhere for the ancestors of the Hemiptera—and I would again emphasize the fact that a study of Psocid venation furnishes the most promising clues for tracing the origin of the Hemiptera. This does not imply that the Psocids are actually ancestral to the Hemiptera, but the Psocids and their allies parallel the Hemiptera so extremely closely in many respects, that we are forced to conclude that their lines of descent quickly merge as we trace them back to their common origin in forms resembling the Protorthoptera in the original Protorthopteron-Protoblattid group which gave rise to the insects capable of holding the wings along the abdomen in repose.

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[7] The Hemiptera have an extremely large, well developed basoplica and basosinus or fold and pocket at the base of the anal region of the fore wing, for example, present in all of the descendants of the common ancestors in the Protorthopteron-Protoblattid stem, but lacking in the Odonata, Ephemerids, etc., as described in a paper on the thorax of the roach. The fold and pocket were apparently developed in connection with the folding of the wings along the top of the abdomen, and the presence of the typical fold and pocket in the Hemiptera clearly points to their Orthopteroid origin.

The remarkable parallelism in the venation of the wings, from the lowest to the highest members of the Psocid and Hemipterous groups, has already been discussed in great detail (*e.g.*, Psyche, 29, 1922, p. 23, etc.) and there is no necessity of again going over the evidence already presented. I would, however, briefly compare the wings of the extremely primitive fossil Hemipteron *Prosbole* shown in Fig. 8 (which is generally considered to be like the original type from which the wings of both Homoptera and Heteroptera were derived) with the Psocid wing shown in Fig. 6 (the irregular cross veins have been omitted from the figure, so as not to obscure the main veins). The anals were not preserved in the incomplete fossil imprint of *Prosbole* (Fig. 8), but the remarkable resemblance in the branches of cubitus is at once apparent in the two wings (Figs. 8 and 6), and in both, media occupies the central portion of the wing and is composed of four main branches; and the general character of radius and subcosta is very similar in the two insects under consideration, which illustrate very plainly the remarkable similarity between the wings of the Hemiptera and the Psocids.

Recently, Tillyard, 1926 (Amer. Jour. Science, 11, 1926, pp. 315 and 381), has figured the oldest known (and hence presumably the most primitive) Psocid and Hemipterous types of wings from the Permian beds of Kansas, and these insects substantiate in a remarkable fashion the parallelism I pointed out several years ago, between the Hemiptera and the Psocids with their allies. In fact, one has but to glance at the Psocid shown in Fig. 17 and the Hemipteron shown in Fig. 16 to be convinced that both must have arisen from an immediate common ancestor, and if the wings of the Psocids and Hemiptera become so much more strikingly alike as we go back further in geologic history the only conclusion that we can accept is that both lines of descent quickly merge as we trace them into or just beyond the Permian. The ancestral forms to which both types apparently lead back were doubtless Protorthopteroid (*i.e.,* Protorthoptera-like) forms resembling the Protorthopteroids shown in Figs. 18 and 19.

In the Journal of the N. Y. Entomological Society, 31, 1922, p. 77, I have called attention to the presence of a gnathorhabdon (*gr* of Figs. 12 and 13) or slender maxillary style (which Heymons, 1899, states develops like the lacinia of other insects—although Heymons is unfortunately too prone to confuse the homologies of the parts he describes in developing insects) in Thysanoptera, Hemiptera, Psocids and their allies; and others, such as Boerner have also called attention to the resemblance in the mouthparts of Thysanoptera, Hemiptera, etc. Furthermore, the ovipositor is extremely similar in Thysanoptera and Hemiptera, and the tarsal segments, antennal segments, neck sclerites and innumerable anatomical features clearly point to a close relationship between the Psocoid and Hemipteroid insects thus bearing out the evidence of the venation, etc., which indicates that the Psocids and Hemiptera arose from an immediate common ancestry which also gave rise to the Thysanoptera, etc.

I have already called attention to the strong resemblance between the wings of the Psocids and Hymenoptera (*e.g.,* Can. Entomologist, 1922, p. 206) and indicated that such a comparison shows that the commonly accepted interpretation of the Hymenopterous venation is incorrect. Tillyard, 1924 (Amer. Jour. Science, 8, p. 111), has recently pointed out what appears to be the correct interpretation of the Hymenopterous venation, from a comparison with the wings of the fossil Protohymenoptera discovered by him; but he does not emphasize the fact that these Protohymenoptera (Fig. 14) evidently arose from ancestors very like those giving rise to the Psocid and Hemipteron wings shown in Figs. 17 and 16 and I would therefore again call attention to the fact that the Hymenoptera, as represented by the ancestral type shown in Fig. 14, were derived from forebears remarkably like those of the Psocids shown in Fig. 17 and the Hemipteron shown in Fig. 16. The similarity in all three wings (Figs. 14, 16, and 17) should be evident to everyone, and there is no necessity to call attention to each of the veins in detail. The Homopteron wing shown in Fig. 15 has been included to show that even in some Permian Hemiptera the bases of M and Cu have been captured by R, thus showing at a very early date the development of a tendency likewise exhibited by the Psocids and Hymenoptera—and of course by the Protohymenoptera also. In fact, there are so many similarities in various features of the body among the Psocids, Hymenoptera and Hemiptera (with their allies) that one is forced to conclude that all of these insects arose from extremely closely allied Protorthopteroid (*i.e.*, Protorthoptera-like) forebears, and I feel sure that these Protorthopteroid ancestors resembled the Protorthopteroids shown in Figs. 18 and 19 very closely, although the wings shown in these two figures are oligoneurous (*i.e.*, with few veins) while some of the members of the common ancestral group which gave rise to the Psocid-Hemipteron stem and to the Holometabola, were probably polyneurous.

These very small, oligoneurous Protorthopteroids, such as the ones shown in Figs. 18 and 19, with reduced cubitus, but with media tending to be four-branched (or three-branched as in many of their descendants), and with the radial sector occupying a rather large portion of the middle of the wing, may be spoken of as the "Microrthoptera," in discussing the evolution of the higher forms, at the base of whose lines of descent these Microrthoptera stood. These Microrthoptera are evidently modified Protorthoptera, but they exhibit tendencies reappearing in many members of the Psocid-Hemipteron stem, and in certain Holometabola also; and the adumbrations (or foreshadowings) they exhibit of features later developed in the derived groups makes a study of the Microrthoptera of much greater interest and importance than *Eugereon,* or any of its relatives, for determining the origin of the Hemiptera and their allies.

Since *Eugereon* and its relatives are not "Protohemiptera," or insects ancestral to the Hemiptera in any way, the designation "Protohemiptera" is a misnomer when applied to *Eugereon* and its allies, and the designation Protohemiptera should be reserved for the immediate ancestors of the Hemiptera, which will undoubtedly be found in the early Permian or pre-Permian strata, when these have been more thoroughly searched. I would therefore suggest that the ordinal name of the group to which *Eugereon* belongs be changed from " Protohemiptera " to some such designation as Apopalaeodictyoptera which would indicate that *Eugereon* and its allies represent merely a specialized side-line leading off from the Palaeodictyoptera, and that *Eugereon* is an out and out Palaeodictyopteroid in all of its known anatomical features!

The Synarmogoidea (Palaeorthoptera) serve to connect the Palaeodictyoptera with the common Protorthopteron-Protoblattid stem, and these forms intervene between the Palaeodictyoptera and the rest of the insects, which were capable of holding the wings along the abdomen in repose. Since the Hemiptera clearly belong to the insects which have developed the ability to lay the wings along the abdomen in repose, their ancestors must be sought in the common Protorthopteron-Protoblattid stem, to which all such insects owe their origin. When those who try to tell us of the origin of the Hemiptera, become informed of the insuperable objections to regarding *Eugereon* as the ancestral type, and when they know of the many facts pointing to a Protorthopteroid ancestry for the Hemiptera, they will doubtless realize that there is no justification for seriously proposing hereafter, that *Eugereon* is ancestral to the Hemiptera, and a long-standing misconception will be justly abandoned!

ABBREVIATIONS.

A—Anal veins.
b—Beak or elongated mouthparts.
bp—Basipalpus or basal segment of palp.
Cu—Cubital veins.
dp—Distipalpus or distal segment of palp.
ga—Galea.
gr—Gnathorhabdon or maxillary seta.
lp—Labial palpi.
lr—Labrum.
M—Median veins.
md—Mandible.
mg—Maxillary galea.

mn—Mentum.
mp—Maxillary palpi.
pg—Palpigers.
R—Radial veins.
Rs—Radial sector.
Sc—Subcostal vein.

EXPLANATION OF PLATES I AND II

Fig. 1. Ventral view of head and prothorax of *Eugereon boeckingi,* from drawing by Handlirsch, 1909.
Fig. 2. Portion of head, beak and fore leg of *Mecynostoma dohrni* (a Palaeodictyopteron), from drawing by Brongniart, 1893.
Fig. 3. Labium of the Dipteron *Anisopus punctatus,* ventral (posterior) view, from Crampton, 1925.
Fig. 4. Labium of *Cicada* sp. (posterior view), from Crampton, 1921.
Fig. 5. Base of fore wing of *Eugereon boeckingi,* from Handlirsch, 1909.
Fig. 6. Fore wing of Psocid *Calopsocus infelix* (cross veins, etc., omitted), after Enderlein, 1903.
Fig. 7. Base of hind wing of *Eugereon boeckingi,* after Handlirsch, 1909.
Fig. 8. Fore wing of fossil Hemipteron *Prosbole hirsuta* (cross veins omitted), after Handlirsch, 1925.
Fig. 9. Labium of *Corecoris* sp., posterior view.
Fig. 10. Distal portion of fore wing of fossil insect *Mesotitan scullyi,* after Tillyard, 1925.
Fig. 11. Hind wing of fossil Hemipteron *Mitchelloneura permiana,* after Tillyard, 1921.
Fig. 12. Maxillary region of Homopteron *Ptyelus flavescens,* after Crampton, 1923.
Fig. 13. Maxilla of the Thysanopteron *Heliothrips,* after Peterson.
Fig. 14. Fore wing of the fossil Protohymenopteron *Permohymen schucherti,* after Tillyard, 1924.
Fig. 15. Fore wing of fossil Hemipteron *Lophioneura ustulata,* after Tillyard, 1921.
Fig. 16. Fore wing of fossil Hemipteron *Permoscytina kansasensis* (pterostigmal area dotted) after Tillyard, 1926.

Fig. 17. Fore wing of fossil Psocid *Dichentomum tinctum,* after Tillyard, 1926.

Fig. 18. Fore wing of fossil Protorthopteroid *Lepium elongatum* (meshwork omitted), after Handlirsch, 1925.

Fig. 19. Fore wing of fossil Protorthopteroid *Metropator pusillus* (cross veins omitted), after Tillyard, 1926.

NOTES ON ABERRATIONS OF NEW JERSEY BUTTERFLIES.

By C. Rummel, Newark, N. J.

(*Continued from December number.*)

Euphydryas phaeton Drury, abberration. Two female specimens bred from larvae taken at Hillside, N. J., in May, 1920—in collection of C. Rummel.

orange colored spots are so small and tinged with black scales to be nearly obliterated. The orange spots on discal area of primaries are completely absent, giving those specimens a decidedly blackish appearance. The white spots are about normal. On the under side the orange colored spots are slightly more pronounced; otherwise normal.

Basilarchia archippus Cramer, aberration. One female specimen taken at Green Village, N. J., August 14, 1923—in collection of C. Rummel.

This specimen has a large whitish patch on all four wings. On the under side this patch is diffused to spread all over the wing, giving the specimen a much lighter appearance on both sides than normal *archippus.*

Basilarchia archippus Cramer, aberration. One male specimen bred in Kearny, N. J., in 1918—in collection of C. Rummel.

The orange brown to be found on normal *archippus* on both primaries and secondaries is replaced with dark brown uniformly tinged with black. The black line traversing the secondaries is much broader and shifted closer toward the outer margin, reducing this brown band between the traverse line and the outer margin to seven oval brown spots. The white dots, 15 in number, contained in the border are replaced with blue dots. On the under side much of the brown is replaced with black or tinged with black scales. The black traverse line showing on the upper side is narrower with a blue parallel line on the inside and nearly all the white markings are replaced with blue giving this specimen a much darker appearance than normal *archippus.*

(*To be continued.*)

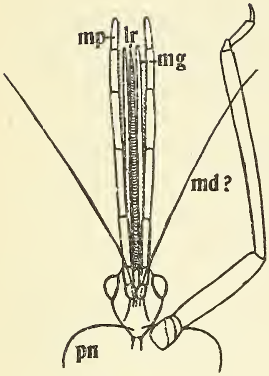

mp
lr
mg
md ?
pn

Fig. 1

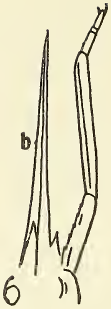


Fig. 2

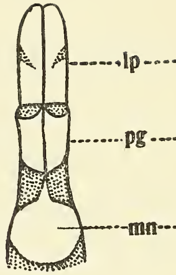


Fig. 3

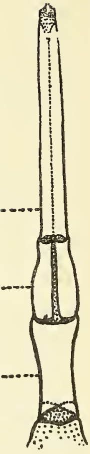


Fig. 4

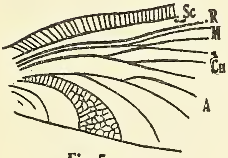


Fig. 5

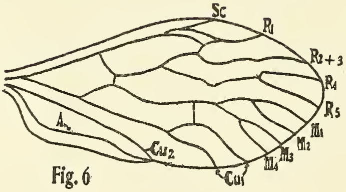

Sc
R1
R2+3
R4
R5
M1
M2
M3
M4
Cu1
Cu2
A

Fig. 6

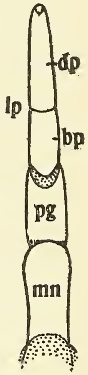
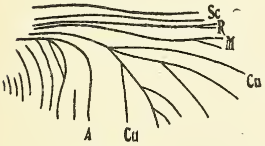

dp
lp
bp
pg
mn

Fig. 9



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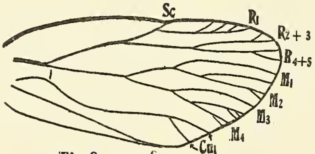

Sc
R1
R2 + 3
R4+5
M1
M2
M3
M4
Cu1
Cu2

Fig. 8

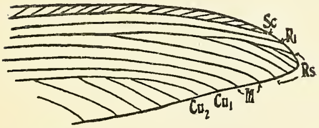
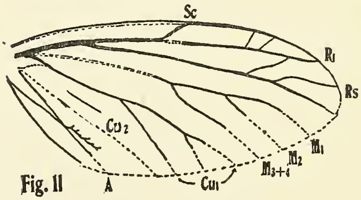

Sc
R1
Rs
M
Cu1
Cu2

Fig. 10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R1
Rs
Cu2
M1
M2
M3+4
Cu1
A

Fig. 11

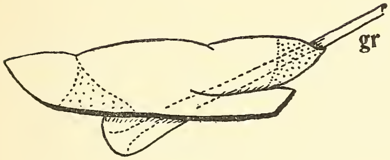

Fig. 12

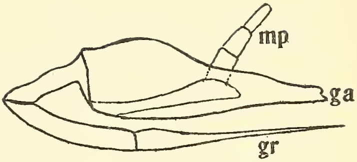

Fig. 13

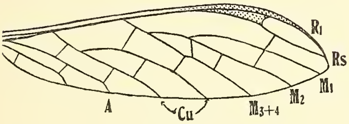
R_1
Rs
M_1
M_2
M_{3+4}
Cu
A

Fig. 14

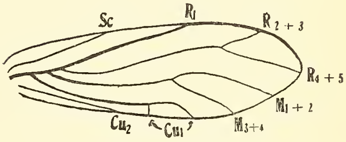
Sc
R_1
R_{2+3}
R_{4+5}
M_{1+2}
M_{3+4}
Cu_1
Cu_2

Fig. 15

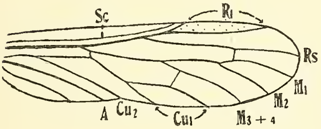
Sc
R_1
Rs
M_1
M_2
M_{3+4}
Cu_1
Cu_2
A

Fig. 16

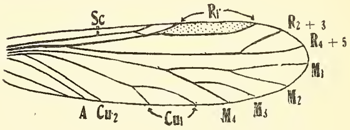
Sc
R_1
R_{2+3}
R_{4+5}
M_1
M_2
M_3
M_4
Cu_1
Cu_2
A

Fig. 17

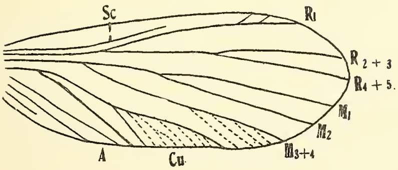
Sc
R_1
R_{2+3}
R_{4+5}
M_1
M_2
M_{3+4}
Cu
A

Fig. 18

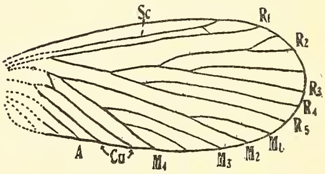
Sc
R_1
R_2
R_3
R_4
R_5
M_1
M_2
M_3
M_4
Cu
A

Fig. 19

NOTES ON MUSCOID SYNONYMY.

By J. M. Aldrich, Associate Curator, U. S. National Museum, Washington, D. C.

Cylindromyia pusilla n. n.

Mr. Curran has kindly called my attention to the fact that my *Cylindromyia nigra* (Proc. U. S. N. M., 68, art. 23, 1926, 11) was preoccupied by Villeneuve, Annales Soc. Ent. France, 1917 (1918), p. 504. I therefore propose for my species the new name *Cylindromyia pusilla.*

Scologaster immsii Tothill.

I am also indebted to Mr. Curran for the information that my *Scologaster fuscipennis,* described in Insecutor Ins. Menst., xiv, 1926, 53, from Szechuen Province, China, is the same species which Tothill described as *Gymnochaeta immsii* in Bulletin of Entom. Research, ix, 1918, 47, from Bhowali, Kumaon, India. There is a paratype in the Canadian Collection, from which Mr. Curran sent me some additional items, although there was little doubt of the synonymy from the description. I would retain the genus *Scologaster* on the characters I have already given.

Sarcophaga obtusifrons Thomson.

I described *Sarcophaga peltata* in 1916 (Sarcophaga and Allies, p. 216) from Porto Rico, and material was later received from Central America. Quite recently I found the same species in abundance in a collection of Samoan Sarcophagas that I was identifying for Professor Buxton, of the London School of Tropical Medicine. This led me to a further investigation of our collection, and I discovered that Coquillett many years ago had identified *Sarcophaga obtusifrons* Thomson from the Galápagos Islands. This was the original locality, and the identification can hardly be doubted, from the golden pollen of the fourth abdominal segment, etc. On spreading the genitalia of the Galápagos males, they were found to be the same species. My *peltata* is therefore a synonym of *obtusifrons* Thomson (Eugenies Resa, 1868, 536), and the species is very widely distributed through the tropics. It is very likely that *Sarcophaga taitensis* Schiner (Novara, 1868, 314), from Tahiti, is the same, as the fourth segment and genitalia are golden. His male type should be examined to settle the question. It has been usual to give priority to Novara over Eugenies, but Kahl has shown (Ann. Carnegie Mus., xi, 1917, 392, 393) that there is room for discussion on the point.

Eucelatoria australis Townsend.

Walton, Proc. Ent. Soc. Wash., xvi, 1914, 93, described *Compsilura oppugnator,* new species, from Porto Rico. In our collection Townsend had placed the type as a synonym of his *Eucelatoria australis,* described from Perú in Proc. U. S. N. M., vol. 43, 1912, 315. I agree with the synonymy, but there is considerable variation in the discals, ocellars, and bristles of the facial ridges. The females have no ocellars or very small ones; as they are absent in Walton's type this probably accounts for his generic reference, although the species having bare eyes is not a true *Compsilura.* Our collection includes a series of seven reared from *Calpodes ethlius* in St. Vincent, West Indies, by F. Watts. The species is barely distinct from *Eucelatoria armigera* Coquillett.

Sturmia inca Townsend.

In Annals of the Entomological Society of America, vol. 4, 1911, p. 142, Townsend proposed the name *Zygosturmia inca* new genus and species, based on some internal organs of a Peruvian muscoid; he supplied the external characters in Proceedings U. S. National Museum, vol. 43, 1912, p. 323, the types being two females from Sullana, Perú.

The species is common in the Southern States, there being in the National Museum, besides the types, about 300 specimens from Miami, Florida, collected in 1908 by Dr. and Mrs. Townsend; four from Audubon Park, Louisiana, bred from *Herse cingulata* Fabricius by C. E. Smith; thirty-four from Victoria, Texas, reared by J. D. Mitchell from the same host; fourteen from the same place, reared from Sphinx larvae, perhaps the same host as preceding; six from College Station, Texas, collected by H. J. Reinhard; and there is also one from Oak Grove, Virginia, collected by Townsend.

On comparing it with the European *Sturmia vanessae* Robineau-Desvoidy (recently made a synonym of *bella* Meigen), the type species of Sturmia, I think they are congeneric in even a narrow sense. *Inca* is much allied to *distincta* Wiedemann, our common sphinx parasite, but is a little smaller, and the fourth abdominal segment is black on about the basal half, the remainder red, but not densely golden pollinose; the palpi are generally black to the extreme tips, while in *distincta* they are usually reddish at tips. The male genitalia are of the same ordinary structure in both, and the third abdominal segment has in the males of both a roundish area of matted hair on each side below. *Sturmia cubaecola* Jaennicke (*sociabilis* Greene) is a very closely allied species with abdomen wholly black at tip, and the palpi black only basally. We have six types (of *sociabilis*) and six other specimens from Porto Rico, and two more from Greenwich Park, British Guiana, reared from sphinx larvae by G. E. Bodkin.

The Genus Epidexia Townsend.

In the Journal of the New York Entomological Society, xx, 1912, 112, Townsend established the genus *Epidexia*, mostly on internal and egg characters; he gave additional external characters in Insecutor Ins. Menst., iv, 1916, 54. The type and sole original species was *filamentosa*, new; but in 1916 the author noted that Coquillett's *Masicera pulverea* "practically belongs to this genus," and noted some points of resemblance and difference.

Coquillett's types are both males, one from Florida and the other from Tifton, Georgia. Townsend did not describe the male of *filamentosa*, although at present there are seven males in the collection, all taken at Miami, Florida, in November, 1908, by himself and wife, several on the same day as the females which he described. If he had had these before him when he wrote the notes just mentioned, he would have seen that the Tifton, Georgia, type of Coquillett's *pulverea* is identical. It is a larger and more robust specimen, and has three sternopleurals. The other Coquillett type, which now bears the holotype label, differs from the Tifton one only in having the first posterior cell closed in the border instead of very short petiolate. It is apparently a little more robust in form, but the thorax has been somewhat flattened in pinning, the dorsum having several evident dents. One of the two type specimens of *filamentosa* now in the collection, the paratype, has three sternopleurals on one side, although all the other Miami specimens of both sexes have only two on each side. The absence of petiole in one specimen is only what would be expected in an occasional case where the petiole is normally very short. Although the matter is not entirely free from doubt, I consider *filamentosa* a synonym of *pulverea*.

There are three specimens as large as the Tifton one which have black legs; one of these is a female from Opelousas, Louisiana, the others are males from Falls Church, Virginia (Knab), and Beltsville, Maryland (Walton). These three all have two sternopleurals and the usual short petiole, and I do not believe they represent a distinct species, although in all the others the coxae, femora and tibiae are reddish-yellow. The Beltsville specimen has no ocellars, although all the others have a small pair.

The Genus ALLOPHOROCERA Hendel.

In Psyche, vol. xiv, 1917, 141, H. E. Smith described *Allophorocera montana,* the first and so far the only American species to be assigned to this genus. The type male, from Powderville, Montana, was deposited in the collection of the Montana State College. One female marked type, but evidently allotype or paratype, is in the National Museum, to which have been added a female from Fairview, British Columbia (Buckell), a male from Cranbrook, B. C. (Garrett), and a female from Mount Lowe, California (Aldrich). Three other females in the type lot were perhaps retained in Mr. Smith's collection. Before I had discovered that our male specimen belonged to Smith's species I had placed it in *Tachinomyia,* as it agrees well with that genus, and has the same characteristic genitalia, the inner forceps united into a slender hook, and the outer forming flat, adherent plates with a fingerlike process. It separates from all other known members of *Tachinomyia* by having discal macrochaetae on the third segment, and sometimes on the second. On reviewing the matter, I am convinced that it belongs to this genus.

Allophorocera was proposed by Hendel, in Verhandlungen K. K. Gesellschaft Wien, vol. li, 1901, 203. It had only one species, *Dexodes auripilus* Brauer and Bergenstamm. The characters given as diagnostic are rather minute ones, and are not definitely compared with those of the genotype of *Dexodes* (*spectabilis* Heigen of Brauer and Bergenstamm, equals *albisquama* Zetterstedt, according to Bezzi in Pal. Kat.). We have both type species in the National Museum, and I should consider them congeneric. The male genitalia in both are of the more usual type, the inner forceps divided, and the outer well developed. In both *auripila* and *albisquama* the distance of the tip of the fourth vein from the extreme apex of the wing is about one-half that which separates the tips of the second and third veins; while in the American *montana* here transferred to *Tachinomyia,* the former distance is just about equal to the latter. In other words, the apical cell ends much farther before the tip of the wing in *montana* than in the type species of Dexodes and Allophorocera.

"*New Holarctic Muscoidea.*"

In a recent paper, with the above title (Insecutor Ins. Menstruus, xiv, 1926, 24–41), Dr. C. H. T. Townsend has proposed twenty new genera, each with a single species. Fourteen of these are based on new North American species, two on previously described North American species, and the remaining four on European described species. I have diligently studied the full descriptions of the first mentioned fourteen, endeavoring to find the genotype species in the National Museum collection, with considerable success and quite surprising results. As it is necessary to have a large collection for reference in elucidating these, and other workers would be under some disadvantage in this regard, it seems obligatory for me to publish my conclusions. I have added notes on the two genera based on described North American species, and have listed for completeness the new European genera at the end. All of the new species were collected by Townsend when he was in the employ of the U. S. Bureau of Entomology some years ago.

1. (Page 25). *Mallochomyia johanseni,* new genus and species, for *Phormia caerulea* Malloch, the species being preoccupied. The name *Boreëllus aristatus* Aldrich and Shannon was proposed in 1923 for the same species (Ins. Ins. Menst., XI, 107); and more recently Shannon, while retaining the genus *Boreëllus,* has made the species a synonym of *Sarcophaga atriceps* Zetterstedt, a European species placed in *Onesia* in the Palaearctic Catalogue (Shannon, Proc. Ent. Soc. Wash., 28, 1926, 128).

2. (Page 25). *Gymnogaster,* new genus, for *Gymnophania montana* Coquillett. Said to differ from *Gymnophania* by " cubitus being reduced to a faint even curve." Brauer and Bergenstamm, however, define *Gymnophania* as having " cubitus rotundatus, fere nullus"; they identified one of our specimens as "*Gymnophania* sp." Their figure of the head of the European type species seems identical with ours, but there is no figure of the wing known to me. As the European species is not in our collection and there is no evidence that it has been seen by Townsend, I think it much more likely that *montana* is identical with the European species than that they belong to different genera.

3. (Page 26). *Pseudoeribea paradexoides* new genus and species. Described from a female, Mount Holyoke Gap, Mass. I have not been able to identify this in our collection.

4. (Page 27). *Apacheprospherysa orbitalis* new genus and species. Described from two males taken by Townsend on the South Fork of Eagle Creek, Sierra Blanca, N. M., at 8,000 feet. I have not been able to find this in the collection.

5. (Page 28). *Palpexorista phoroceroides* new genus and species. Described from one female, Mount Holyoke Gap, Mass. This is the female of *Phorocera imitator* Aldrich and Webber (Proc. U. S. N. M., 63, 1924, 63), described from Lyme, Conn.; we now have a female from New Haven, Conn., exactly matching Townsend's description. I still think that the species goes properly in *Phorocera,* but we indicated the subgenus *Parasetigena* as a narrower group, and Townsend himself proposed *Neophorocera* type *edwardsii* Will. (*claripennis* Mcq. of Aldrich and Webber) in Proc. Ent. Soc. Wash., 14, 1912, 162, which would include *phoroceroides* in the most restricted sense. Hence there can be no use for *Palpexorista,* any more than for the new specific name.

6. (Page 29). *Catagoniopsis infernalis* new genus and species. Described from one female, Hell Canyon, Manzano National Forest, New Mexico. This is *Phorocera meracanthae* Greene, Proc. Ent. Soc. Wash., 23, 1921, 126; two of Greene's paratypes were collected by Townsend on the same day as his own type, and the data were published in full by Greene. In the arrangement proposed by Aldrich and Webber, *meracanthae* was placed in the subgenus *Patelloa*; I would consider further generic division superfluous.

7. (Page 31). *Schizactia* new genus, for *Schizotachina vitinervis* Walton. Four nominal characters are given, but they readily reduce to two—the fourth vein is obsolete from the bend, and the hind crossvein is retracted. As to the latter character, I have noted that it has slight taxonomic value in those Tachinids in which the first posterior cell ends in the tip of the wing (Trans. Amer. Ent. Soc., LII, 1926, 7). In the genotype of *Schizotachina, convecta* Walker, there is a marked variation in the position of the hind crossvein, and it is sometimes almost as much retracted as in *vitinervis*; while in almost every specimen the fourth vein is markedly thinner beyond the bend. These characters do not seem to me to be generic.

8. (Page 31). *Visayalydina sierricola* new genus and species. Described from one female, Las Visayas, Sierra Madre, Chihuahua, Mexico. I have not been able to find this species in the collection.

9. (Page 32). *Plagiophryxe pecosensis* new genus and species. Described from several females, Harvey's Ranch, Pecos National Forest, New Mexico, at 10,000 feet. The full description shows conclusively that this is *Zenillia* (*Phryxe*) *vulgaris* Fallén, a common fly in the Canadian Zone of North America and also in Northern Europe. It is the genotype of *Phryxe*.

10. (Page 34). *Nemosturmia pilosa* new genus and species. Described from one female, Franconia, N. H. This is *Winthemia fumiferanae* Tothill (Canad. Ent., XLIV, 1912, 2). I consider it a true *Winthemia* and no one has suggested a different disposition of it until now.

11. (Page 35). *Sisyrosturmia chaetosa* new genus and species. Described from one female, Base of Mt. Washington, N. H. I have not been able to identify it in our material.

12. (Page 36). *Eophrissopolia acroglossoides* new genus and species. Described from two females, Grove Hill, Md., taken by Townsend on October 31 and November 2, on Aster flowers. The Museum has four additional females taken by Townsend on same flowers and same place and date; also several of both sexes from this region and a long series from Arizona, New Mexico, California and Colorado, largely collected by Townsend. The species was identified as *Chaetogaedia crebra* Van der Wulp by Coquillett in his Revision (1897, p. 137); and I believe this was correct. We now have three cotypes of *crebra*, received from the British Museum, which differ only in having the pollen of the head more yellowish. A male from Beltsville, Md., however, has precisely the same head color as the Mexican cotypes. The genitalia in the Arizona and Maryland specimens are the same as in the cotype. *Prospherysa vilis* Van der Wulp, the genotype of *Chaetogaedia*, is also represented by cotypes in our collection; it has the parafacial row of bristles more hairlike but evidently homologous. Even if the stouter row in *crebra* were of generic value, Townsend has already proposed to make this species the type of his genus *Phrissopolia*, so the new *Eophrissopolia* is superfluous. I think *Chaetogaedia* properly includes *crebra*, of which *acroglossoides* is a synonym.

13. (Page 37). *Frontinogaedia* new genus for *Baumhaueria analis* Van der Wulp. This species was placed in *Chaetogaedia* by Coquillett (Revision, 1897, 137). The characters given by Townsend seem to be purely specific—one of them, the elongation of the second aristal joint, is the same in the genotype of *Chaetogaedia*.

14. (Page 37). *Catalinovoria cauta* new genus and species. Described from one male, Sabino Basin, Santa Catalina Mts., Arizona. This is without doubt the species which Coquillett identified as *Siphoplagia rigidirostris* Van der Wulp (Revision, 1897, p. 78), and which I described as *Sthenopleura latifrons* in Trans. Amer. Ent. Soc., LII, 1926, 18. The date of my publication is April 14, while that of Townsend is March 11, giving him an ample margin of priority. The Museum has a long series (my types). Townsend's expression, " 5R closed far before tip," means that the first posterior cell is closed *in the margin* far before tip, not that it is long-petiolate. He does not mention the pteropleural bristle, which I take to be the main generic character.

15. (Page 39). *Xanthoernestia antennalis* new genus and species. Described from one female, Base of Mt. Washington, N. H. I am unable to find this in the collection.

16. (Page 40). *Oxydosphyria infernalis* new genus and species. Described from two females, Hell Canyon, Manzano Mts., New Mexico. This is *Peleteria iterans* Walker var. *flaviventris* Van der Wulp, of Curran's revision of *Peleteria* (Trans. Roy. Soc. Canada, Sec. 5, 1925, 238, f. 11). The Museum has six specimens, of both sexes, from Las Vegas Hot Springs, N. M. (Barber); Koehler, N. M. (Walton); Las Cruces, N. M. (Grabham); Custer, S. D. (Aldrich); and Mound Valley, Chihuahua, Mexico (Townsend). The species is not separable from *Peleteria,* in my opinion.

The European new genera are as follows:

(Page 30.) *Erynniopsis rondanii* new genus and new specific name for *Erynnia nitida* Rondani, preoccupied.

(Page 31.) *Strobliomyia* new genus, for *Thryptocera fissicornis* Strobl.

(Page 32.) *Prooppia* new genus, for *Carcelia fuscipennis* Robineau-Desvoidy.

(Page 38.) *Echinosomopsis* new genus, for *Echinosoma* Girschner, preoccupied.

The genotypes of these European genera are not in the National Museum, and Townsend does not claim to have seen them.

A NEW SEMIUM FROM ARIZONA AND COLORADO (HEMIPTERA, MIRIDAE).[1]

By Harry H. Knight, Ames, Iowa.

The genus *Semium* was established by Reuter (1876) for a single new species, *hirtum*, from Texas. *Semium hirtum* Reut. has since been found to occur in several eastern states, breeding on *Euphorbia adenoptera*. The genus has remained monotypic until the present time, hence it is of more than ordinary interest to add a new species to this rather singular genus.

Semium subglaber n. sp.

Size and coloration suggestive of *hirtum* Reuter, but easily distinguished by the minute, appressed pubescence, and by the differently formed impressions on the scutellum.

> ♂. Length 2.6 mm., width 1 mm. Head: width .60 mm., vertex .32 mm.; sculpturing much as in *hirtum*, but glabrous. Rostrum, length .74 mm., scarcely attaining posterior margin of sternum, brownish, apex blackish. Antennae: segment I, length .19 mm.; II, .69 mm.; III, .56 mm.; IV, missing. Pronotum: length .55 mm., width at base 1 mm.; sculpturing of the disk differs from *hirtum*, marked with fewer but better defined, raised dark lines. Scutellum dark, a pair of small, rounded impressions of different color within the triangular depression on disk; lateral margins with an elongate, sharply defined impression, a smaller spot at basal angle.
>
> Clothed with minute, appressed pubescence which is apparent only under strong magnification (34 diam.). Coloration suggestive of *hirtum*, but the reddish tints are here largely dark brownish black; cuneus uniformly, opaque whitish, apex never dark; clavus dark brownish black, margin along claval suture opaque creamy white like the corium; apical one-third of embolium and outer apical area of corium occupied by a nearly quadrangular black spot, leaving inner apical angle of corium white. Membrane and veins uniformly black, opaque, a white spot on vein at apex of smaller areole, and contiguous with the white cuneus. Legs brownish black, the hind femora white with narrow base and apical one-third blackish, a corresponding pale area is much obscured on the intermediate pair. Sides of venter and the pleura tinged with

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[1] Contribution from the Department of Zoology and Entomology, Iowa State College, Ames, Iowa.

reddish which is apparent beneath a dull, opaque pale ground color.

♀. Length 2.6 mm., width 1.1 mm. Head: width .65 mm., vertex .38 mm. Antennae: segment I, length .20 mm.; II, .77 mm., pale to reddish; III, .60 mm.; IV, .33 mm. Pronotum: length .62 mm., width at base 1.09 mm. Pubescence and form of body very similar to the male, but head, pronotum and legs much paler; the raised lines on pronotal disk not darkened.

Holotype: ♂, September 13, 1925, Oracle, Arizona, alt. 4,500 feet (A. A. Nichol); author's collection. *Allotype:* same date as the type. *Paratypes:* ♂, taken with the types. ♂ ♀, June 15, 1900, Pueblo, Colorado (E. D. Ball). ♂, August, Los Angeles County, California (Coquillett); U. S. N. M. collection.

Mr. Nichol collected this species on an undetermined *Euphorbia.*

NOTES ON THE BIOLOGY OF DINEUTUS (GYRINIDAE).

By Melville H. Hatch,[1] Minneapolis, Minn.

Mr. C. A. Frost writes me that for about twenty years he has taken *Dineutus* (*s. str.*) *ciliatus* (Forsberg) (=*vittatus* Germ., Ochs, Ent. Blatt., 1925, 21: 174) in a small stream near his home in Framingham, Mass. The stream has a sandy bottom, is about five feet wide, from six to ten inches deep, and the current at the middle is one foot a second or less. The beetles are more inclined to stay near the bank, but frequently move out towards the middle, where their behavior is similar to that described by me for *Dineutus* (*Cyclous*) *discolor* Aubé in a previous number of this journal (1925, 20: 105–106), which were living in a current of about eight inches a second. Further observations on the habitat of *Dineutus* (especially exotic species), *Andogyrus, Macrogyrus,* and *Enhydrus* are desirable.

I am able to announce the following key to the first instar larvae of the local species of *Dineutus,* subgenus *Cyclous.*

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[1] A contribution from the Zoological Laboratory of the University of Michigan.

A[1] Tergites of segments behind head uniformly pale.
  B[1] Mandibles entirely pale; head pale except a light gray oval area between eyes that does not attain anterior margin; legs and appendages of head pale .... *hornii* Rbts.
  B[2] Mandibles in part dark brown or blackish.
    C[1] Mandibles, a triangular spot between the bases of the antennae and the eyes, the neck on both the dorsal and ventral surfaces, the posterior margin of the dorsal plates on the first thorax segment, and a small spot on the dorsal surface of the base of each leg in the shape of an inverted "v" dark brown (Wilson, 1923, Bull. Bur. Fish. 39 [Document 953] : 304) .... *americanus* L.
    C[2] Distal portion of mandibles and narrow area mesad to margin of eyes pale; head behind posterior margin of eyes light gray; head in front of hind margin of eyes up to and including proximal portion of mandibles blackish; occiput blackish; segments of antennae, maxillary palpi, labial palpi, and legs distinctly suffused with black or gray. *nigrior* Rbts.
A[2] Tergites of segments behind head mottled each with six brownish irregular longitudinal stripes which are somewhat broken up and reduced on the one or two posterior and anterior segments; head with light gray oval area between eyes not attaining anterior margin of head; occiput blackish with a fine median white line; posterior margin of pronotum very narrowly blackish .... *discolor* Aubé.

Unfortunately the mottled markings of *discolor* fade out in material preserved in alcohol. Wilson's observation that the first instar larvae of *americanus* are identical in color with the subsequent stages makes it possible that this key may hold good for the later instars.

FAUNA SUMATRANA—AQUATIC HETEROPTERA.

By J. R. de la Torre-Bueno, White Plains, N. Y.

Mr. E. Jacobson, the noted collector at Fort de Kock, Sumatra, has had the goodness to send me some time since a number of mounted and unmounted aquatic Hemiptera, for study in connection with his own faunistic work on the Island.

This small lot contains the usual Oriental forms, but in addition there are some which seem unknown to science. All are here enumerated in the order employed by me in Spolia Zeylanica.[1]

Cryptocerata.

Family Corixidae.

Porocorixa sp.

One specimen from Fort de Kock, January, 1922. This species is seemingly undescribed and is apparently the first record of the genus from the Oriental Region. There being only one battered male specimen on hand makes it undesirable, indeed, unwise, to describe it.

Corixa affinis Distant

Of this species, described from British India, seven were taken in January and 3 in March, 1922, at Fort de Kock.

Micronecta minthe Distant

There are two specimens of this species, one from Fort de Kock, January, 1921; and one from Sibigo, August, 1913. It was described from Bengal and has since been recorded from Ceylon.

Micronecta haliploides Horvath

Fort de Kock, January, 1921, 1 specimen; March, 1921, 3; October, 1922, 1. This species was described from Ceylon.

Micronecta mnemonides Kirkaldy

Five specimens from Fort de Kock, January, February and March, 1921; and October, 1922. Described from Ceylon.

The well-known idiosyncrasy of describers in this group in favor of color *à outrance* makes the satisfactory delimitation of its species a matter of faith rather than hope; and certainly not of absolute certainty. The preceding species have been named as best might be, from sundry papers by Breddin, Kirkaldy and Horváth; and by the inadequate descriptions of Distant in Fauna of British India. Short of a complete revision and study of morphological details, there can be no authority in this family.

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[1] 1925, vol. viii, pt. 2, pp. 223–234. On a some aquatic Hemiptera from Ceylon with description of New Species.

Family BELOSTOMATIDAE.

Lethocerus indicus Lep. & Serv.

Three from Fort de Kock, January, 1922. The specimens seem rather teneral. Is already known from Sumatra and Java; and spreads all over the Oriental Region.

Sphaerodema molestum Dufour

Nine specimens from Fort de Kock, December, 1921. While the species is known from India and Malacca, it does not as yet seem to have been reported from Sumatra.

Sphaerodema rusticum Fabricius

Of this species, already known from Sumatra, there are three specimens taken January, 1922.

Family NAUCORIDAE.

Heleocoris bergrothi Montandon

Three specimens in the lot are from Fort de Kock, January, 1922. This species has heretofore been recorded only from British India (Distant).

Family NOTONECTIDAE.

Enithares marginata Fieber

Fort de Kock, January and June, 1922, 5 specimens and some nymphs in various stages. Not before recorded from Sumatra.

Anisops niveus Fabricius

Six from Sinabang (Simalur), January, 1913; known from Burma and the Oriental region, but apparently not specifically reported from Sumatra.

Anisops sp.

Four specimens from Sinabang, January, 1913; a large species, somewhat resembling *niveus*.

Anisops sp.

There are 11 specimens of this smaller species from Fort de Kock, April and December, 1921, and January, 1922.

These two species are difficult to place. They may be undescribed. But where species are described by vague color characters and by structures common to the genus, it is unwise to pronounce apostolically without a thoroughgoing revision of the group.

Family NEPIDAE.

Ranatra parmata Mayr

There is one specimen from Aur (Kumanis), West Coast of Sumatra, March, 1914. Described originally from Batavia (Java), and seemingly not recorded from Sumatra.

Laccotrephes robustus Stal

One adult and two nymphs are from Andalas (Tandjing), West Coast of Sumatra, May, 1914. Not before recorded from Sumatra, although it is known from the Philippines, Perak and Java.

Laccotrephes grossus Fabricius (*rubra* auctt. nec Linné)

One specimen also from Andalas, same date. Another Oriental species, recorded from Formosa and Japan, but apparently not as yet reported from Sumatra.

Gymnocerata.

HYDROMETRIDAE.

Hydrometra lineatus Eschsch.

This widespread species is represented by 21 specimens from Fort de Kock. While seemingly not as yet known from Sumatra, it has been reported from Java, the Philippines, Perak and other parts of the Oriental Region not so near.

Hydrometra longicapitis n. sp.

> Head: length, 91 units;[1] ao : po :: 6 : 23; clypeus as broad as long, bluntly angulate anteriorly; antennae, 17 : 30 : 97 : 50; head grooves, upper fine, as long as eye, lower not as long as eye; rostrum, extending just back of eyes.

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[1] 1 unit = 1/20 mm. in all these descriptions.

Pronotum: Length, 35 units; pits absent on anterior lobe, except a row going all around the collar, present on the posterior lobe in longitudinal rows.

Metanotum: Length (estimated), 20 units; concealed by strap-like microptera which reach to about the middle of abdominal segment I.

Coxae: Distance from I to II and II to III, 20 and 38 units respectively; all three acetabula pitted, with about ten or twelve pits on each acetabulum, dull.

Anterior femora, extending 10 units beyond the apex of the head, 100 units long; *posterior femora,* extending 25 units beyond apex of abdomen, 137 units long.

Abdomen: Length, 118 units, upper side entirely sericeous or velvety; male processes mammilose, widely separated, close to anterior margin of segment, a series of parallel fine crosswise grooves back of the processes on the same segment; male terminal segment sinuate laterally, with the usual spine, not very long or slender. Total length, 13.2 mm.

Described from one specimen, male, from Ft. de Kock, Sumatra, collected by E. Jacobson; type in U. S. National Museum, No. 40208.

This species differs from *lineatus* in the longer and more slender head; absence of silvery thoracic longitudinal line and stripe on the hemelytra, the femora greatly surpassing the head and the abdomen, respectively, mammilose male processes, rostrum not going beyond eyes, etc.

While, as may have been noticed at the very beginning of this paper, I am most loath to describe species from only one specimen, the characters in Hydrometra are now developed to a point where species may be described with an approach to mathematical precision. And the male characters are such that there can be no uncertainty about using them freely and accurately. Here, as elsewhere, I have eschewed color characters, for specific color description of a tortoise-shell cat would make different species of cats of all other colors or combinations of colors, a *reductio ad absurdam* commended to the attention of pure colorists.

Family VELIIDAE.

Rhagovelia nigricans Burmeister.

Of this seemingly widely distributed species there are 22 specimens from Fort de Kock. While it has been recorded from

British India, Ceylon, Africa, etc., it seems not as yet known from Sumatra.

Microvelia albolineolata n. sp.

Head: Length, males, 9 units; females, 10 units; median line present, fine, glabrous; no pits near eyes; antennae, 5:5:10:10 (male type), 7:7:12½:11 (female allotype), segment I curved, stoutest, II straight, not quite so stout, III slender, straight, IV slender, tapering slightly; rostrum in both sexes extending to middle of metasternum.

Thorax: Length, 20 units (male type), 21 units (female allotype); punctured with small, black, moderately deep punctures; hemelytra surpassing abdomen, with the usual golden pubescence, which is much longer on the costal margin.

Anterior femora: 12 units (type), 16 (allotype); *tibiae,* 13 units (type), 15 (allotype); *tarsi,* 7 units (male), 8 (female).

Middle femora: 20 units (type), 20 (female); *tibiae,* 13 (male), 15 (female); *tarsi,* 5:7 (male, not type), 6:7 (female allotype).

Posterior femora: 17 units (male type), 24 units (female); *tibiae,* 22 units (male type), straight, 26 (female); *tarsi,* 6:4 (male), 6:6 (female). In this set, as well as in the others, the femora are measured without including the long trochanters.

Abdomen: (Measured from under side) 30 units (male), 34 (female); sutures evident; segment I dark, remaining ones light straw color; spiracles black, submarginal.

Total length: Male type, 3 mm.; allotype, 3.35 mm.

Described from 7 specimens from Fort de Kock, E. Jacobson, collector; type and allotype, in U. S. National Museum, No. 40210; paratypes, in collection J. R. de la Torre-Bueno.

This species differs from the other known Oriental forms in having antennal segment III as long as or longer than IV (in the female). Thus this character of the length of antennal segment IV fails as a mark of the genus. It is also most reminiscent of the Neotropical *Microvelia longipes* Uhler, except, of course, for the length of the legs, which are normal in this new species. The antennae are slightly longer than the head and thorax taken together. All other proportions may be readily worked out by the dimensions given.

It is regrettable that the fine long series in hand (nearly 100 specimens) should have suffered severely in the mails. The specimens having been put up dry in papers, the delicate antennae and tarsal joints are nearly all broken off, and none of the type material has either entire legs or a perfect pair of antennae. The species is so distinctive, however, that it cannot be taken for anything else.

Color picture: This species is very clearly marked and showy. In addition to the greyish white margin of hairs about the eyes, the narrow pronotal collar is greyish. The pronotum is dark brownish grey, with three broad sooty black stripes, the middle one interrupting the anterior grey collar; the humeri and the posterior angle are flavous. The hemelytra have coarse black venation, a pure white claval streak and a pure white elongated dot on the membrane; the cells are of about the same color as the prothorax.

Microvelia villosula n. sp.

Head: Length, male, 5 units; female, 8; a glabrous line goes down anteriorly 2/3 to the anterior part of the head and there are two small glabrous elongate depressions near the eyes; antennae, male, 3 : 2 : 2 : 4, female, 3 : 3 : 4 : 5, comparatively short and stout, segment I curved, as usual in the family, IV fusiform; rostrum in both sexes extending nearly to distal margin of mesosternum, with slight variation.

Thorax: Length, male, 8 units; female, 14; apterous only; two glabrous lines run diagonally in from each side.

Anterior femora: Male, 6 units, stout, stouter than in female; female, 8; *tibiae,* 5 and 7, respectively; *tarsus,* missing in males, females, 4.

Middle femora: Male, 7; female, 10; stout in male, but little thicker than the tibiae in female; *tibiae,* male, 7, curved slightly; female, 10, straight; *tarsi,* male, 2 : 3; female, 4 :3½.

Posterior femora: Male, 8; female, 12; *tibiae,* male, 8; female, 12; *tarsi,* male, 2 : 2; female, 3 : 3. Femora in both sexes only slightly thicker than the straight tibiae.

Abdomen: Length, male, 15 units; female, 20; nearly parallel sided in male, broad in female, in which the connexiva are very broad and rise at an abrupt angle, making the dorsum into a moderately deep trough; beset with long grey hairs, varying in density above and below, otherwise brown pilose; a glabrous dorsal line in segments 4, 5 and 6 of the male, not reaching the anterior and posterior margins of the segment at its extremities, present also in the female, but not so obvious.

Total length: Male, 1.4 mm.; female, 2.1 mm.

Described from 5 males and 3 females from Fort de Kock, E. Jacobson, collector. Type and allotype, in collection U. S. National Museum, No. 40209; paratypes in my collection.

This is a dark brown species, of fluctuating intensity. Acetabula and legs light yellow.

None of the specimens from which this description is taken is perfect; the only two with one complete antenna each are the type and allotype; the others have no antennae and otherwise are more or less maimed. The species, however, is quite distinct and easily separable from the other Oriental forms (see my key cited in Spolia Zeylanica).

ARCTOCORIXA ATOPODONTA, NEW NAME FOR ARCTOCORIXA DUBIA ABBOTT.

By H. B. Hungerford, Department of Entomology, University of Kansas, Lawrence.

In 1916 Dr. Abbott described in *Entomological News,* Vol. XXVII, p. 342, a well marked Corixid under the name of *Arctocorixa dubia.* An examination of the type discloses the fact that Dr. Abbott omitted the most characteristic feature of the male pala. At the distal end of the row of pegs is one larger peg that stands out of line and apart from the others. While the species was described from Massachusetts it is quite generally distributed. I have taken long series in New York, Minnesota, Michigan, Kansas and Colorado. The renaming of this species is made necessary by the fact that *Corixa dubia* was proposed in 1869 for an Arctocorixa species by Douglas and Scott. Their species may or may not be synonymous with *A. fabricii* Fieber.

A SHORT REVIEW OF NOTARIS (COLEOPTERA: CURCULIONIDAE).

By L. L. Buchanan, U. S. Biological Survey, Washington, D. C.

To the three species of *Notaris* now listed from North America a fourth, the largest yet discovered, is here added. This apparently new weevil is represented by three specimens, all in at least fairly good condition, found in toads' stomachs.[1] The notes on the other species are based chiefly on material in the collections of the National Museum and Biological Survey.

The structural characters of *Notaris* are too well known to need repeating here, but one or two points relating to the sculpture of the elytra seem to be of enough general interest to warrant brief mention. The genus, as a whole, is quite definitely characterized by a peculiar kind of elytral sculpture which can be made out, in some degree or other of modification, in each of our four species. In its assumed simplest form, this sculpture consists of a system of fine anastomosing lines or reticulations, each cell thus formed, of which there are two to four in the width of an interval, enclosing a fine puncture. This stage of development of the sculpture is well illustrated in the species *aethiops.* The sculpture in *goliath* is much the same as in *aethiops,* except that the fine cross lines are a little wider and deeper, giving the appearance, from some angles, of transverse rugosities. In the assumed extreme development of the sculpture, as shown by *bimaculatus,* both cross and longitudinal anastomosing lines have become still wider and deeper, isolating, as a result, the intervening points which take the form of granules or minute tubercles, each one retaining the characteristic puncture on its posterior face. The resulting surface texture is densely granulose in nature. About midway between *aethiops* and *bimaculatus* stands *puncticollis,* some specimens of which clearly show a gradual replacement of sutural reticulations and punctures with lateral granulations. These four sculptural modifications, though typical in a general way of the different species, are too variable for accurate use in identification, the instability being particularly true of *bimaculatus,* where the granules may be feebly elevated, flat-topped, and poorly defined. In occasional individuals of this same species, the two or three dorsal intervals near the suture have cells, granules, and all intermediate stages between these two, and in such cases the basic identity of the cells and granules is clearly disclosed.

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[1] The examination of a large number of toads' stomachs, recently made by Remington Kellogg in the Biological Survey Laboratory, has shown, among other things, that these lowly and often maligned creatures frequently perform valuable economic service as destroyers of noxious insects in agricultural environments; and also, that they may play the unexpected and, from the scientist's viewpoint, equally useful part of entomological collector. The toad, being active at times and under conditions peculiar to himself, captures many rare or even undescribed forms of invertebrate life, in addition to furnishing, through his long list of food items, some interesting facts regarding the distribution and abundance of the organisms eaten.

The presence or absence of small spines at the apex of the tibiae, structures which were mentioned incidentally by Leconte '76, and Chittenden '06, supplies a positive and easily perceived means of splitting the genus. These spines rise from near the base of the mucro, projecting at right angles to it, and are only a little longer than the apical fringe of spinules. The fore tibia has one, the middle and hind tibiae two each, one on either side of the mucro; this arrangement is identical in both sexes. A similar set of spines occurs in the related genus *Procas.*

The four North American species or *Notaris* are separable as follows:

A. Tibiae with small spines at apex (figs. 12 and 14), and with their inner edge not or feebly denticulate. Pygidium of male truncate or broadly rounded at apex, its inner surface not grooved. Antennal club slightly longer than the combined length of the preceding 4 funicular segments.

1. Length, 5–6.5 mm. Upper surface black, appearing glabrous, but with sparse, extremely fine recumbent hair. Elytral intervals with minute punctures and fine anastomosing lines; strial punctures smaller, close-set, sometimes more or less coalescent to form strial grooves. Prothoracic punctures coarse, moderately dense, but not forming rugae on dorsum. Beak stouter, less arcuate, 7th funicular segment twice as broad as long. Ocular lobes feeble. Fifth ventral segment of male 2½ times as broad as long (53 to 20), the punctures subequal in size to those on the preceding segments; in female, this segment is less transverse and with smaller and denser punctures than on the other segments. Michigan, Colorado, Montana, Manitoba, Alberta, Hudson Bay Region,

and Alaska are the localities of the specimens seen.
aethiops Fab.

2. Length 4.5–6.5 mm. Upper surface mottled reddish-brown to black, distinctly pubescent. Elytral intervals more or less granulose or transversely rugose, more strongly so towards sides of elytra; strial punctures larger, quadrate, well separated to sub-contiguous but not forming strial grooves. Pronotal punctures denser and somewhat rugose. Seventh funicular segment only a little wider than long. Ocular lobes strong. Fifth ventral, male, just twice as broad as long, the punctures finer and denser, male and female, than on preceding segments. Ranges across the continent in the northern tier of states, south to Indiana and Colorado, north to Alberta. This is the common species east of the Mississippi River.
puncticollis Lec.

Aa. Tibiae simply mucronate at apex, coarsely denticulate along inner edge of fore and middle pair. Beak stouter, more arcuate and shining, punctures sparser. Middle of apical margin of male pygidium with an emargination which is the external mark of a longitudinal groove on its inner surface (not visible without dissection). Antennal club longer than preceding 3, but shorter than preceding 4, funicular segments combined. Ocular lobes strong.

3. Length 5.5–8.5 mm. Elytral intervals densely granulose, the striae, in places, feebly impressed or obscured by the sculpture. Prothoracic and abdominal punctuation coarse and dense, the punctures seldom separated by as much as their own diameter; punctures of head smaller than on pronotum, moderately dense, of beak still smaller and sparser. Seventh funicular segment sub-triangular and about as long as broad. Pygidial emargination deeper, inner groove distinct. Third elytral interval normally with a patch of pale scales behind the middle. Wisconsin, Iowa, North Dakota, South Dakota, Wyoming, Montana, and Mackenzie. Europe.
bimaculatus Fab. (*wyomingensis* Chttn.)

4. Length, 9–11 mm. Elytral intervals punctulate and with reticulate lines, the sculpture appearing transversely rugose from some angles; striae distinct and uninterrupted. Sculpture above and below much sparser. Seventh funicular segment transverse. Pygidial emargination broad, the inner groove feeble. No pale spot on 3rd interval. Nevada and Oregon .... **goliath** n. sp.

Notaris goliath n. s.

Oblong, black; head, prothorax, and under surface shining, elytra dull; vestiture consisting of hair-like, yellowish-brown, prostrate scales, a little broader and denser along sides of pronotum. Length of type, male, 11 mm.

This species, in outline and general structure, is a close copy of *bimaculatus*. The characters in which it differs from that species, in addition to the points brought out in the key and figures, are: Punctures of head minute and sparse; punctures of pronotum large but irregularly spaced, and varying from close to sparse in an area on either side of the smooth median line; abdominal punctures on first 4 segments smaller and sparser; elytra with the striae sharply defined, the vestiture (which is prostrate as in the other species) more slender and hair-like. The smallest of the 3 specimens is ½ mm. longer than the largest *bimaculatus* seen, although the latter species is said to attain a length of 10 mm. in Europe. In the female the beak is about 1/10 longer than in the male, and with the tip of scrobe located at 3/5 from base. The tip of scrobe in the male is slightly more advanced in position. Expressed in ratio form, that portion of the female beak anterior to the tip of scrobe is to the corresponding portion in the male as 4 is to 3.

Type locality.—Carson, Nevada. Two specimens (male type, and female paratype) from stomach of *Bufo boreas,* Biol. Survey No. 900.

Other locality.—Fort Klamath, Oregon. (1 female paratype.) Stomach of *Bufo boreas,* No. 546.

Type.—Cat. No. 40098 U. S. N. M.

The 2 female paratypes are deposited in the Biological Survey collection.

Explanation of Plate I.

(All figures are from the male.)

Figs. 1, 2, and 3. Side view of head and beak of *bimaculatus, puncticollis,* and *aethiops.*

Figs. 4, 5, 6, and 7. Sixth and seventh funicular segments, and club, of *puncticollis, aethiops, bimaculatus,* and *goliath.*

Figs. 8 and 9. Lateral and dorsal views of median lobe of male genitalia of *goliath.*

Fig. 10. Pronotum of *bimaculatus,* to show the coarse, dense punctuation.

Fig. 11. Dorsal view of *goliath.*

Fig. 12. Fore tibia of *aethiops.*

Fig. 13. Fore tibia of *bimaculatus.*

Fig. 14. Middle tibia of *puncticollis.*

Figs. 15, 16, and 17. Antero-ventral margin of prothorax of *aethiops, puncticollis,* and *bimaculatus.*

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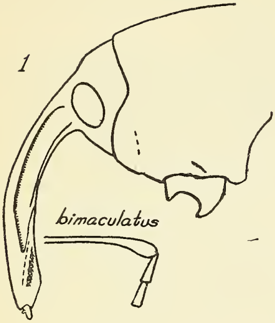
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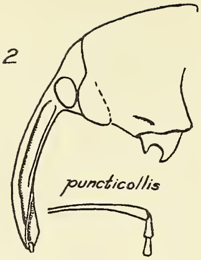
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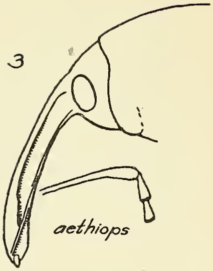
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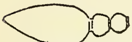
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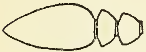
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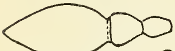
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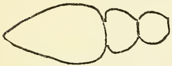
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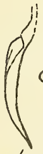
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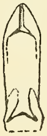
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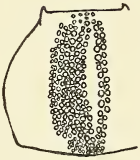
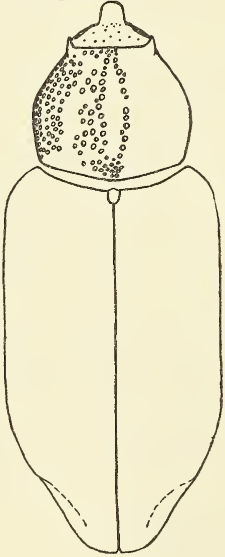
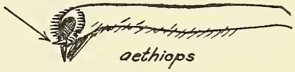

bimaculatus

11 goliath
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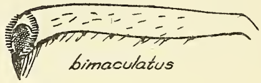
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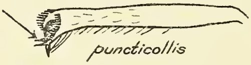
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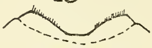
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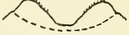
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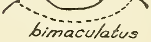
17 bimaculatus

THE ARMY WORMS.[1]

By S. E. Crumb, U. S. Bureau of Entomology, Washington, D. C.

Certain species of noctuid larvae disperse into surrounding areas from regions in which they have developed with more or less marked unanimity of action and, owing to this habit, have been called army worms. A number of important pests are included in this heterogeneous group of larvae, and the writer has sought to include descriptions in the following pages of all species of larvae which have been recorded as having the army-worm habit.

Key to the Species of Larvae Having the Army-Worm Habit.

1. Adfrontal sutures terminating in the occipital foramen; adfrontal setae 2, about their width apart or less removed from the apex of the occipital foramen; seta A2, approximately equidistant from A1 and A3. (Fig. 1, F.) Skin granulose 2

   Adfrontal sutures not reaching the occipital foramen; adfrontal setae 2, distinctly more than their width apart removed from the apex of the occipital foramen; seta A2 distinctly nearer to A1 than to A3. (Fig. 1, E.) Skin smooth excepting in *Laphygma frugiperda* 4

2. Reticulation of the head replaced entirely by close-set pale infuscated brown flecks (fig. 1, C); cervical shield infuscated brownish with a definite pattern of minute infuscated spots, the anterior margin with a distinct dark fuscous area .... *Euxoa* (*Chorizagrotis*) *auxiliaris* Grote.

   Head more or less fuscous- or ferruginous-reticulate (fig. 1, D); the coloration not arranged in flecks; cervical shield not as above 3

3. Setigerous tubercle II twice as large as I; skin with small granules set contiguously like the blocks in a pavement. *Feltia gladiaria* Morr.

   Setigerous tubercle II of the same size as I; skin set with coarse, isolated, strongly convex granules. *Feltia ducens* Wlk.

4. Each mandible with five distinct teeth (fig. 2, J); no dark longitudinal stripe on the abdomen through setigerous tubercle II 7

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[1] Order Lepidoptera, family Noctuidae.

Each mandible with but two obscure teeth (fig. 2, I); with a dark longitudinal stripe on the abdomen through setigerous tubercle II 5

5. With a pale longitudinal stripe between setigerous tubercles I and II; spiracles entirely black; setigerous tubercles II on 8th abdominal segment farther apart than tubercles I. *Cirphis unipuncta* Haw.

With not more than an inconspicuous pale line between setigerous tubercles I and II, spiracles yellowish or grey with black rims; setigerous tubercles II on 8th abdominal segment not farther apart than tubercles I 6

6. Lower half of supraspiracular area strongly infuscated or black, much darker than the upper half. *Cirphis phragmatidicola* Guén.

Lower half of supraspiracular area but slightly infuscated, but little darker than the upper half. *Cirphis pseudargyria* Guén.

7. Line joining setigerous tubercles III and V on seventh abdominal segment passing through the spiracles or posterior to it (fig. 2, O); the three setae on the first segment of the maxillary palpus in the form of coarse setae (fig. 2, M) 8

Line joining setigerous tubercles III and V on seventh abdominal segment passing distinctly anterior to the spiracle (fig. 2, P); two of the three setae on the first segment of maxillary palpus in the form of broadly spatulate appendages (fig. 2, N) . . . . *Neleucania albilinea* Hübn.

8. Seta O1 posterior to the line connecting the centres of ocelli IV and VI (fig. 1, G); spinneret as in Figure 2, A, B, C. 9

Seta O1 on or anterior to the line connecting the centres of ocelli IV and VI (fig. 1, H); spinneret as in Figure 2, D, E, F 11

9. Puncture SOa less than twice as near to SO3 as to SO2 (fig. 2, Q); front and adjacent areas solid black; reticulation of head entirely replaced by dark freckles. *Agrotis fennica* Tauscher.

Puncture SOa three times as near to SO3 as to SO2 (fig. 2, R); front and adjacent areas not black; head reticulate. 10

10. Ocelli III and IV narrowly separated (fig. 2, G); with wedge-shaped black subdorsal markings at least posteriorly; spiracles pale with black rims; no yellow mid-dorsal spots . . . . *Agrotis c-nigrum* Linn.

Ocelli III and IV well separated (fig. 2, H); black subdorsal markings linear; spiracles entirely black; with a distinct

mid-dorsal yellow dot on each abdominal segment at least anteriorly.
Lycophotia margaritosa Haw., var. *saucia* Hübn.

11. Third segment of labial palpus slightly more than half as long as the basal segment (fig. 2, L); skin pavement-granulose; setigerous tubercles rather large.
Laphygma frugiperda S. & A.

Third segment of labial palpus as long as the basal segment (fig. 2, K); skin smooth; setigerous tubercles minute...12

12. Head of mature larva 2 mm. broad; subdorsal black spots on abdominal segments, if present, not angulate dorsally; reticulation of head dark; adfrontal areas not white.
Laphygma exigua Hübn.

Head of mature larva 2.6 mm. or more broad; subdorsal black spots on abdominal segments angulate dorsally; adfrontal areas conspicuous white, except in *X. eridania* in which the reticulation is reddish brown 13

13. Adfrontal areas conspicuous white, markings of head dark. 14

Adfrontal areas pale brown, sutures pale but not white; head a bright brown which may be somewhat infuscated in an area beside the front.
(*Prodenia*) *Xylomyges eridania* Cramer.

14. Brown ground color of head overlaid and all but concealed dorsally by deep fuscous or black; reticulation obsolete on forepart of head, obscure reticulation laterally (fig. 1, B).
Prodenia ornithogalli Guenée.

Head with broad dark submedian arcs but with distinct fuscous reticulation anteriorly (fig. 1, A).
Prodenia praefica Grote.

THE ARMY CUTWORM.

Chorizagrotis auxiliaris Grote.

Mature larva.—Head 3.2 mm. broad. Body about 40 mm. long and 5 mm. broad, broadest through abdominal segments one to four; skin finely pavement-granulose; color pale grayish much flecked with white, the dorsum tinged with brownish, and with an indistinct band of white splotches below the spiracles. Head pale brownish gray, the infuscation arranged in pale infuscated brownish flecks somewhat darker posteriorly. Cervical shield infuscated brownish, the median third of the anterior margin bearing a prominent dark fuscous area. Setigerous tubercle II usually three times as large as I. Claws of legs with the basal part strongly acutely angulate.

Distribution.—This species has not been reported from east of the Mississippi River but occurs throughout nearly all of the remainder of the United States and in Canada and Mexico.

Food plants.—The larva is a very general feeder and has been reported as injuring nearly all grain, forage, garden and berry crops, as well as fruit trees and various weeds. It normally feeds on the surface of the soil and appears periodically in enormous numbers. This species has proved particularly injurious in the Rocky Mountains and adjacent areas, both in the United States and Canada.

THE CLAY-BACKED CUTWORM.

Feltia gladiaria Morrison.

> *Mature larva.*—Head 3.2 mm. broad. Body about 37 mm. long and 5.5 mm. broad, first four abdominal segments of about equal width, the body tapering both anteriorly and posteriorly from these; skin set with small, flat or very slightly convex shining granules arranged contiguously like the blocks in a pavement; general color pale shining grayish varying to slightly darker. Dorsal area sharply defined, distinctly paler than the supraspiracular area and tinged with ferruginous. Supraspiracular area infuscated. Setigerous tubercle II twice as large as tubercle I. Each anterior proleg with about six crochets. Spiracles set in the dark supraspiracular coloration. Claws of legs with the basal part broadly rounded, slightly if at all angulate. Head grayish brown with fuscous submedian arcs and reticulation.

Distribution.—Occurs throughout the United States east of the Rocky Mountains.

Food plants.—The larva is a rather general feeder on field, garden, and berry crops and has been particularly destructive in Illinois and Kentucky.

THE DINGY CUTWORM.

Feltia ducens Walker.

> *Mature larva.*—Head 2.5–2.7 mm. broad. Body 22–32 mm. long and 5.5 mm. broad, of nearly equal width throughout but tapering slightly posteriorly; skin set with coarse, isolated, shining, roundingly subconical chitinous granules; general color pale grayish brown sometimes tinged with ferruginous, dorsum paler than the supraspiracular area and sometimes bearing a segmental series of ovoid or rhomboidal infuscated markings, supraspiracular area fuscous, flecked

with white, darker subdorsally and forming definite dark fuscous spots on at least the anterior half of each abdominal segment, a band of white flecks below the spiracles. Head ground color very pale brownish gray, with strong fuscous submedian arcs, a fuscous area in the ocellar region, and the reticulation fuscous or ferruginous.

Distribution.—This species occurs in the North throughout the breadth of the United States and Canada but is not usually common south of the latitude of Virginia, Tennessee, Missouri, Kansas, Colorado, and Utah.

Food plants.—The larva is a very general feeder on garden and field crops and on weeds. It has the army-worm habit to a very limited degree.

THE ARMY WORM.

Cirphis unipuncta Haworth.

Mature larva.—Head 3.0 to 3.5 mm. broad. Body about 30–35 mm. long and 5.5–6.5 mm. broad, broadest through abdominal segments 3, 4, and 5; skin smooth; general color varying from bright red through pinkish and pale gray to the more usual dark gray. The usual coloration is as follows: Ground color yellowish or grayish more or less tinged with pinkish, dorsum to setigerous tubercle I strongly infuscated, a pale stripe more or less overlaid with fuscous occupying the longitudinal space between setigerous tubercle I and II, a narrow black stripe with setigerous tubercle II near its upper margin, upper half of supraspiracular area pale, slightly infuscated, lower half heavily infuscated or black and including most of the spiracles, below the spiracles abruptly pale tinged with pinkish; spiracles entirely black; head pale gray slightly tinged with brown, the narrow submedian arcs, close reticulation, and 4 lines of fused reticulation posterior to the ocelli, fuscous. Punctures Fa below the level of setae F1. Setigerous tubercles II on eighth abdominal segment farther apart than tubercles I. Cervical shield concolorous with adjacent parts but with the three pale lines strongly outlined in black.

Distribution.—Occurs throughout the United States east of the Rocky Mountains.

Food plants.—The larva feeds by preference on grasses and cereal crops but attacks a wide variety of plants when pressed by hunger.

The Yellow Army Worm.

Cirphus phragmitidicola Guenée.

Mature larva.—Head 3.4 mm. broad. Body about 30 mm. long and 5.5–6 mm. broad, broadest through abdominal segments 3, 4, and 5; general color varying from pale yellowish to a warm yellowish brown; skin smooth. Dorsum unicolorous pale except that the pale middorsal line is continuously outlined with fuscous, a sharply defined, conspicuous, continuous, black stripe including setigerous tubercle II, lower part of the supraspiracular area including setigerous tubercle III and some of the spiracles infuscated, much darker than the dorsad portion which is yellowish, bearing strands of infuscated brown medially, below the spiracles a well-defined pale band, venter pale flecked with white and with brownish strands. Spiracles pale yellowish with black rims. Head ground color pale grayish brown with strong submedian arcs, sparse reticulation, and four lines of fused reticulation about the ocelli, fuscous.

Distribution.—Occurs throughout the United States east of the Rocky Mountains and in California.

Food plants.—The larva feeds on various grasses, including bluegrass and wild rye (*Elymus virginicus* Willd.).

The Brown Army Worm.

Cirphis pseudargyria Guenée.

Mature larva.—Head 3.5 mm. broad. Body about 28–32 mm. long and 5–6 mm. broad, slightly broadest through abdominal segments 2, 3, 4, and 5; skin smooth; general color pale brownish, yellowish brown, or pale gray, more or less tinged with pinkish. Dorsum slightly more infuscated than remainder of body with a slender broken pale middorsal line noticeably outlined, with fuscous only at the juncture of the segments, an indefinite pale line dorsad to setigerous tubercle II and a distinct but not strong fuscous stripe through this tubercle, more infuscated anterior to it, and bordered laterally by pale lines, about the upper half of the supraspiracular area pale yellowish flecked with pinkish, fuscous and brown and bordered dorsally and ventrally by pale lines, lower half of the supraspiracular area slightly more infuscated and partially including the spiracles, subspiracular band pale flecked with pinkish and white merging into the ventral coloration which is pale flecked with yellowish white. Spiracles yellowish to dark gray with black rims. Head pale grayish slightly tinged with brown, the slender submedian arcs, close reticulation, and 4 lines of fused reticulation about the ocelli, fuscous. Cervical shield more infuscated and anal shield more brown than adjacent areas.

Distribution.—Occurs throughout the United States east of the Rocky Mountains north of the latitude of North Carolina, Tennessee and Colorado, and also in Texas.

Food plants.—Larvae have been taken feeding on redtop, timothy, wild rye (*Elymus virginicus* Willd.), wheat and orchard grass.

THE WHEAT-HEAD ARMY WORM.

Neleucania albilinea Hübner.

Mature larva.—Head 3 mm. broad. Body about 25–30 mm. long and 3 mm. broad, tapering from about the third abdominal segment posteriorly; skin smooth; general color varying from green, olivaceous green, yellow or pink to brownish. Dorsum to and including setigerous tubercle I infuscated, with a pale median line. A broad pale stripe with setigerous tubercle II at its upper margin. Dorsal part of supraspiracular area somewhat infuscated, ventral part with setigerous tubercle III in its dorsal margin and including the upper half of the spiracles, dark fuscous. A pale band below the spiracles. Head greenish, with two broad straight submedian fuscous stripes and with three fuscous lines and some fuscous reticulation posterior to the ocelli.

Distribution.—Occurs in the United States north of the latitude of the Ohio River and east of the Rocky Mountains and also in Kentucky, Arizona, New Mexico and Texas.

Food plants.—The larva feeds on various grasses and cereal crops, showing a preference for the heads and a particular fondness for timothy.

THE BLACK ARMY CUTWORM.

Mature larva.—Head 3–3.2 mm. broad. Body about 32 mm. long and 4.5 mm. broad, broadest through abdominal segments 2, 3, and 4; skin smooth; general color black or brownish black with pale stripes. Dorsum paler laterally, infuscated or black medially, sometimes in a segmental series of ovoid markings. From just outside setigerous tubercle II to and partially including the spiracles, black, with a characteristic pale line near the dorsal margin. Below the spiracles a broad pale band with a ferruginous centre. Head ground color yellowish brown, the front, adfrontal areas and a broad margin beside them solid black, reticulation replaced entirely by pale infuscated freckles which are arranged in stripes posterior to the ocelli. Cervical shield black, shining.

Distribution.—Occurs in the latitude of New York and Michigan and northward and is also found in Europe and Asia.

Food plants.—The larva is a very general feeder on field and garden crops, weeds, and the foliage of trees.

THE SPOTTED CUTWORM.

Agrotis c-nigrum Linnaeus.

Mature larva.—Head 3 mm. broad. Body about 35 mm. long and 6.5 mm. broad, abdominal segments of about equal width throughout; skin smooth; general dorsal color usually a dark uniform drab made up of flecks and spots of fuscous and sooty black on a pale yellowish gray ground color, with a dull metallic sheen. Subdorsally a segmental series of sooty black triangular spots obsolete anteriorly. No trace of dark spots above the spiracles. Spiracles yellowish or whitish with black rims. Abruptly nearly uniformly paler below the spiracles. Anal shield small, declivous. Cervical shield fuscous with traces of a pale median line. Head shining, ground color whitish, the fuscous or ferruginous reticulation fused to form a deep fuscous subdorsal line and a spot below the ocelli; submedian arcs broad, deep fuscous, rather angularly diverging at the apex of the front, enclosing a large reticulate area above the front. Each mandible with a large bluntly triangular tooth on the oral face on the first ventral rib.

Distribution.—Occurs in the north throughout the United States and in Canada. The approximate southern limit of the species includes Virginia, Tennessee, Missouri, Kansas and Arizona.

Food plants.—The larva is a very general feeder on garden and field crops, and on the buds and foliage of trees and shrubs. It frequently occurs in company with the Army Worm (*Cirphus unipuncta* Haw.).

THE VARIEGATED CUTWORM.

Lycophotia margaritosa Haworth, var. *saucia* Hübner.

Mature larva.—Head 3.0–3.2 mm. broad. Body about 40 mm. long and 6 mm. broad, the posterior extremity somewhat enlarged and very blunt; skin smooth; general color varying from very pale gray to rather dark fuscous, the latter being the usual color, ground color a dirty yellowish gray. The pale middorsal line represented on the first four abdominal segments by a distinct yellow dot which may also occur on some of the following segments, a fuscous W-shaped mark open anteriorly on the dorsum of the eighth abdominal segment followed by a conspicuous yellowish or orange area, subdorsally a segmental series of linear black spots bordered ventrally by a broken yellowish or orange line which forms an inconspicuous dot near the middle of each segment, supraspiracular area occupied by an inconspicuous sinuous band of fuscous narrowed or more or less obsolete at the spiracles. Spiracles entirely black. Below the spiracles a border of mingled orange and yellow. Venter pale flecked with white. Head ground color whitish with broad black submedian arcs and more or less fuscous reticulation.

Distribution.—This species occurs throughout the entire breadth of the United States and Canada.

Food plants.—The larva is a very general feeder on field and garden crops, on the foliage and fruit of trees and vines, and on various plants in greenhouses and cold frames.

THE FALL ARMY WORM.

Laphygma frugiperda Smith and Abbot.

Mature larva.—Head 2.6 to 2.8 mm. broad. Body about 25 to 36 mm. long and 3 to 5 mm. broad, of practically uniform width throughout; skin set closely with very small, round, convex granules; general color varying from pinkish, through yellowish, olivaceous, and dull gray to almost black. Dorsal area of general color overlaid with strands and flecks of brownish and fuscous, the middorsal yellowish line subdued in color but broad and sharply defined. A broad yellowish subdorsal line just outside setigerous tubercle II. From the subdorsal line to the spiracles an infuscated band intensified on its dorsal margin to form black dashes on the anterior half of each abdominal segment. A broad, sharply defined yellow or whitish band below the spiracles more or less mottled with ferruginous. Spiracles pale with black rims and margined with whitish. Head grayish, pale yellowish or brownish, the adfrontal areas and adjacent margin of the head shield white, the submedian arcs rather slender, reticulation close, ferruginous or brownish, more infuscated dorsally and merging into stripes laterally. Setigerous tubercles rather large, the dorsal tubercles dark, those on the venter paler.

Distribution.—The Fall Army Worm occurs from New York to Florida and westward to Nebraska, Kansas, Texas and New Mexico, but is most common south of the latitude of Virginia. It also occurs in the West Indies and in Mexico.

Food plants.—The larva prefers cereals and grasses but will attack a wide variety of plants.

THE BEET ARMY WORM.

Laphygma exigua Hübner.

Mature larva.—Head 2 mm. broad. Body about 20–30 mm. long and 3–4.5 mm. broad, abdominal segments of about equal width throughout, skin smooth, general color variable, in some specimens green, in others soft shades of gray and brown. In better marked specimens the following coloration features occur: Dorsum of general color overlaid with strands of fuscous, middorsal pale line nearly obliterated on anterior and posterior portions of each abdominal segment by fuscous markings more intense anteriorly, subdorsally a segmental series of dark markings especially distinct on eighth abdominal segment, supraspiracular area darker than the dorsum, a distinct white dot postero-dorsad of the abdominal spiracles, margin between supraspiracular area and ventral coloration somewhat more intensely infuscated than elsewhere with a white line below and with a shade of lavender about the spiracles and along the margin, a dark spot on mesothorax somewhat above the line of the spiracles, venter green flecked with white, spiracles pale yellowish with dark rims. Head pale, with broad submedian arcs, reticulation, and a solid area posterior to the ocelli, fuscous or black. Cervical shield infuscated with three pale lines indicated.

Distribution.—This is a nearly cosmopolitan species. It occurs in the United States in the states bordering on Mexico, in those bordering on the Gulf of Mexico, and also in Colorado and Oregon.

Food plants.—The larva is a very general feeder on field and garden crops, grasses, the foliage of trees, and various weeds, especially pigweed (*Amaranthus*). This species has done damage to sugar beets and cotton and is sometimes a serious tobacco pest in the Transvaal.

THE SEMITROPICAL ARMY WORM.

(*Prodenia*) *Xylomyges eridania* Cramer.

Mature larva.—Head 2.6 mm. broad. Body about 38 mm. long and 5 mm. broad, abdominal segment somewhat enlarged; skin smooth; general color above a deep uniform gray sometimes tinged with olivaceous or pinkish, middorsal line, subdorsal stripe, and subspiracular stripe unicolorous, whitish tinged with orange or pinkish, the subspiracular stripe much the broadest. Laterally on the dorsum a segmental series of black triangles, angulate on their dorsal faces, at least posteriorly. Ventral half of supraspiracular area dark fuscous, dorsal half paler. Venter pale suffused with pinkish or orange and much flecked with white. Head ground color pale yellow overlaid heavily with bright reddish brown reticulation which is more or less fused forming solid areas of reddish brown, without traces of solid black as in *ornithogalli,* excepting occasionally in a small area beside the base of the front, adfrontal sutures pale but not white. Subdorsal spots on the mesothorax absent or smaller than those on the eighth abdominal segment.

Distribution.—Occurs in Georgia, Florida, Mississippi, Texas and California and occasionally is found as far north as Tennessee.

Food plants.—The larva is a general feeder on garden and field crops and on various weeds, especially *Amaranthus spinosus* and pokeweed (*Phytolacca decandra*). It has also been noted as feeding on citrus trees, avocado and willow.

THE COTTON CUTWORM OR YELLOW-STRIPED ARMY WORM.

Prodenia ornithogalli Guenée.

Mature larva.—Head 2.8 to 3 mm. broad. Body about 20 to 36 mm. long and 6 mm. broad at middle; enlarged on metathorax, on abdominal segments one and two, and slightly on abdominal segments 7 and 8; skin smooth; general color varying from pale gray to jet black. In well colored individuals the dorsal coloration is made up of intermingled strands of pale and fuscous; the subdorsal triangular black markings, which are broadest about midway of their length, may be conspicuous on all the abdominal segments or may be obsolete on all but the eighth segment; there may be a bright yellow band outside the subdorsal black triangles or this may be wholly absent; the upper half of the supraspiracular area is pale with pale and fuscous lines medially; the lower half of the supraspiracular area, including the spiracles, is usually fuscous; and there is a subspiracular band of white flecks more or less suffused with orange or pinkish. Ground color of head brown overlaid and all but concealed dorsally by deep fuscous (fig. 1, B), obscurely reticulate laterally, adfrontal areas and the adjacent margin of the head shield conspicuous white, the sutures terminating distinctly before reaching the occipital foramen. Setigerous tubercles minute. Spiracles brownish with dark rims. Legs brown. Prolegs yellowish, their shields pale fuscous to black, the anterior pair each with about 17 to 25 crochets.

Distribution.—This species occurs from New York to Florida and westward to Minnesota, Nebraska, New Mexico, Arizona and California, but is ordinarily common only in the South.

Food plants.—The larva feeds on a wide variety of field and garden crops as well as upon many wild plants.

The Southwestern Army Worm.

Prodenia praefica Grote.

Mature larva.—This species closely resembles *Prodenia ornithogalli* in coloration but may be readily distinguished by the distinct fuscous reticulation on the forepart of the head as shown in Figure 1, A.

Distribution.—Reported from California only.

Food plants.—The larva is recorded as feeding upon alfalfa and cotton.

Plate IV.—Army Worm Structures.

A. *Prodenia praefica:* Head, dorsal view of right side, showing coloration.

B. *Prodenia ornithogalli:* Head, dorsal view of left side, showing coloration.

C. *Euxoa auxiliaris:* Head, dorsal view of right side, showing coloration.

D. *Feltia gladiaria:* Head, dorsal view of left side, showing coloration.

E. *Neleucania albilinea:* Head, dorsal view, showing arrangement of setae and punctures and the adfrontal sutures.

F. *Feltia gladiaria:* Head, dorsal view, showing arrangement of setae and punctures and the adfrontal sutures.

G. *Agrotis c-nigrum:* Head, lateral view, showing arrangement of setae and punctures.

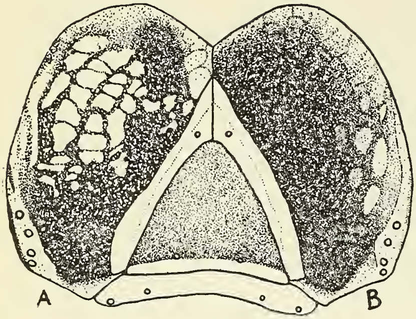
H. *Laphygma frugiperda:* Head, lateral view, showing arrangement of setae and punctures.

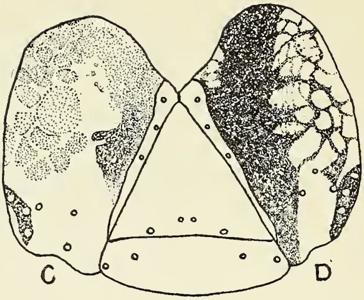
Plate V.—Army Worm Structures.

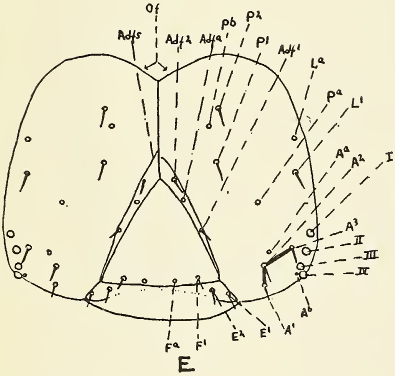
A. *Lycophotia saucia:* Spinneret.
B. *Agrotis fennica:* Spinneret.
C. *Agrotis c-nigrum:* Spinneret.
D. *Prodenia ornithogalli:* Spinneret.
E. *Laphygma frugiperda:* Spinneret.
F. *Xylomyges eridania:* Spinneret.
G. *Agrotis c-nigrum:* Arrangement of ocelli I to IV.
H. *Lycophotia margaritosa saucia:* Arrangement of ocelli I to IV.
I. *Cirphis unipuncta:* Mandible.
J. *Laphygma exigua:* Mandible.
K. *Laphygma exigua:* Labial palpus.
L. *Laphygma frugiperda:* Labial palpus.
M. *Cirphis unipuncta:* Setae on first segment of maxillary palpus.
N. *Neleucania albilinea:* Setae on first segment of maxillary palpus.
O. *Laphygma frugiperda:* Arrangement of setigerous tubercles on seventh abdominal segment.
P. *Neleucania albilinea:* Arrangement of setigerous tubercles on seventh abdominal segment.
Q. *Agrotis fennica:* Head, ventral view of left half, showing arrangement of setae and punctures.
R. *Agrotis c-nigrum:* Head, ventral view of left half, showing arrangement of setae and punctures.

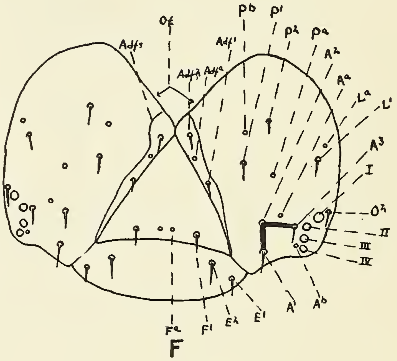
Explanation of Symbols in Plates IV and V.

A1, A2, A3, Aa, Ab, anterior setae and punctures of epicranium.
Adf1, Adf2, Adfa, adfrontal setae and puncture of epicranium.
Adfs, adfrontal suture.
E1, E2, epistomal setae.
F1, Fa, frontal setae and puncture.
G1, Ga, genal seta and puncture of epicranium.
L1, La, lateral seta and puncture of epicranium.
O1, O2, O3, Oa, ocellar setae and puncture of epicranium.
Of, occipital foramen.
P1, P2, Pa, Pb, posterior setae and punctures of epicranium.
SO1, SO2, SO3, SOa, subocellar setae and puncture of epicranium.


A
B


C
D


Of
Adfs
Adf2
Adfa
pb
p2
p1
Adf1
La
pa
L1
Aa
A2
I
A3
II
III
IV
Ab
A1
E1
E2
F1
Fa
E


Of
Adfs
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Adfa
pb
p1
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pa
A2
Aa
La
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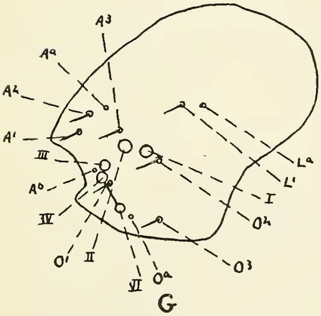
II
III
IV
Ab
A1
E1
E2
F1
Fa
F


A3
Aa
A2
A1
III
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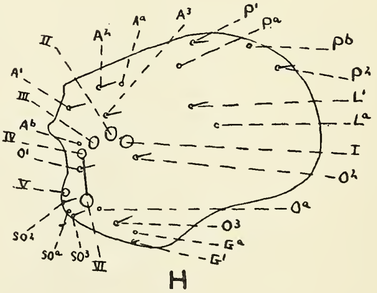
O1
II
VI
Oa
O3
O2
I
L1
La
G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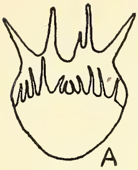
G1
H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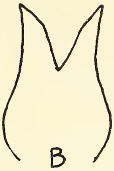
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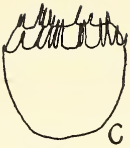
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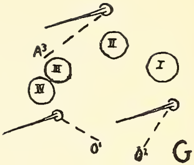
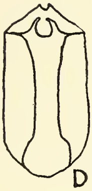

A³
IV
III
II
I
O¹
O²
G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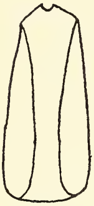
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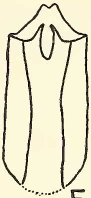
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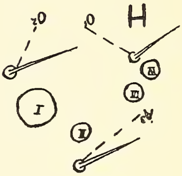
O²
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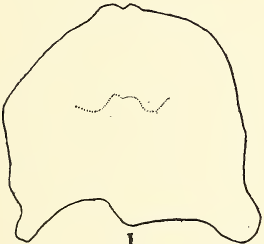
A³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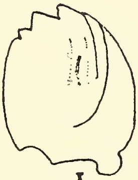
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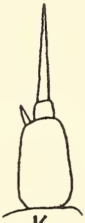
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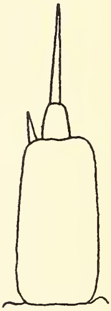
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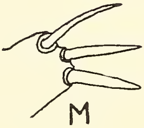
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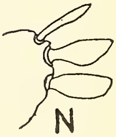
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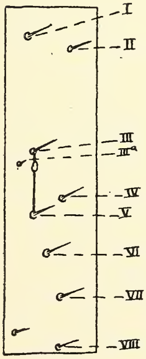
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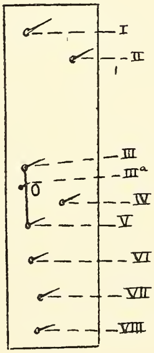
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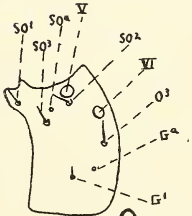
SO¹
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V
SO³
SO²
VI
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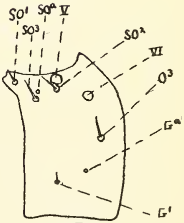
Gᵃ
G¹
Q


SO¹
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SO³
SO²
VI
O³
Gᵃ
G¹
R

UNDESCRIBED SPECIES OF THE GENUS LIMNOPHILA FROM EASTERN NORTH AMERICA (Tipulidae, Diptera).

PART II.

BY CHARLES P. ALEXANDER, Amherst, Mass.[1]

The first part under this general title was published in this BULLETIN in 1926. In the present article, additional species of the subgenera *Ephelia* and *Phylidorea* are described. As before, the species are included in the very extensive series of Nearctic Tipulidae collected by Professor J. Speed Rogers, to whom the types have been returned except in the cases indicated in the text. Part of the type-material of *Limnophila* (*Ephelia*) *irene* was collected in Ontario and was sent to me by Mr. Curran. I wish to express my sincere thanks and appreciation to the above-mentioned entomologists for their kind co-operation in this study.

Subgenus LASIOMASTIX Osten Sacken.

Limnophila (Lasiomastix) macrocera suffusa n. subsp.

Entirely similar to typical *macrocera* (Say), differing in the following regards:

> Flagellar segments slightly more elongated. Wings with the dark pattern much more extensive, especially the markings in cells *R* and *M* which here completely cross the cells as more or less parallel-sided areas, restricting the ground-color to small spots that are smaller than the dark markings; cells *C* and *Sc* darker; anal cells more suffused. In the Georgia paratype, the wing is greatly suffused, the ground-color being reduced to a few scattered pale spots on the disk. Abdomen somewhat shorter, the individual segments being correspondingly abbreviated; tergites brown, margined laterally and caudally with brownish black.

Habitat: Southeastern United States.

Holotype, ♂, Gainesville, Alachua Co., Florida, February 28, 1922 (J. S. Rogers); No. 17. *Paratopotype,* ♂, with the type; ♂, April 2, 1922; No. 39. *Paratype,* ♀, Waycross, Georgia, May 8, 1911 (J. C. Bradley).

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[1] Contribution from the Department of Entomology, Massachusetts Agricultural College.

Subgenus EPHELIA Schiner.

The discovery of two additional undescribed species of *Ephelia* brings the total number from Eastern North America to six. The chief characters for the separation of the species lie in the details of structure of the male hypopygium, especially of the outer dististyle. The accompanying set of figures will serve to show the differences in the shape of the dististyle in the six species under consideration.

KEY TO THE SPECIES OF EPHELIA IN EASTERN NORTH AMERICA.

(Based chiefly on the male sex.)

1. Wings unmarked. (Hypopygium, Fig. 1). . . . *johnsoni* Alex.
   Wings spotted, or spotted and clouded with brown 2
2. Wing-pattern restricted to the vicinity of the veins, there being but a single dark cloud in cell *2nd A* at the end of vein *2nd A*. 3
   Wing-pattern more abundant, there being one or more dark clouds in cell *2nd A* proximad of the one at the end of vein *2nd A*. 4
3. Wings broad; male hypopygium with the outer dististyle powerfully constructed, with a large, broad-based lobe on the basal half of the outer margin (Fig. 2). . . . . *aprilina* O. S.
   Wings narrower; male hypopygium with the outer dististyle long and narrow, with a slender spinous lobe on outer half of outer margin (Fig. 3). . . . . **irene** n. sp.
4. Wing-pattern abundant, with numerous dots and clouds in the cells, including a series of three or four clouds in cell *2nd A*; male hypopygium with the outer dististyle widened distally (Fig. 5). . . . . **vernata** n. sp.
   Wing-pattern more restricted, with only one (in abnormal instances two) clouds in the outer end of cell *2nd A*; male hypopygium with the outer dististyle narrowed distally. . . 5
5. Male hypopygium with the tip of the outer dististyle prolonged into a slender lobe that is bifid at apex (Fig. 4). . . . . *solstitialis* Alex.
   Male hypopygium with the outer dististyle terminating in a simple acute apical spine (Fig. 6). . . . . . . *serotinella* Alex.

The following general notes on the geographical and seasonal ranges of these species may be given: *L. johnsoni* occurs in Ontario, New York and the northern States of New England, flying in late May and throughout June. *L. aprilina* ranges from New York and New England, south in the mountains to North Carolina, flying in April and May. *L. irene* is known only from parts of Ontario and Michigan, flying from mid-June to mid-July. *L. vernata* is known only from the mountains of North Carolina, flying in April. *L. solstitialis* has the widest known range of any of the species, occurring from New York and New England, west to Michigan, south in the Appalachians to Tennessee and Georgia. *L. serotinella* is known only from the mountains of Tennessee, flying in early September.

Limnophila (Ephelia) irene n. sp.

Male.—Length about 5.5 mm.; wing, 6–6.2 mm.
Female.—Length, 5.5–6.5 mm.; wing, 7.5–8.5 mm.
Allied to *L.* (*E.*) *aprilina* O. S., differing as follows:

Praescutal stripes relatively ill-delimited, straight, the lateral stripes not confluent with the median one; scutal lobes dark medially, the remainder of the mesonotum light gray. Pleura dark gray. Femoral apices scarcely darkened. Wings narrow. Wing-pattern as in *aprilina,* sparse but conspicuous, confined to the vicinity of the veins; a series of seven major costal blotches, the first at arculus, the third at origin of *Rs,* the fifth at the stigma; last marginal cloud at end of vein *2nd A.*

Abdominal segments bicolorous, obscure yellow, the lateral margins narrowly, the caudal margins more broadly, dark brown. Male hypopygium with the outer dististyle relatively long and narrow (Fig. 3); outer margin beyond midlength with a small slender spinous lobe; apex of style beyond this spine broad, the outer margin with numerous subappressed spines, the largest spine being apical in position, gently curved. Inner dististyle with a small tubercle on outer margin, this densely provided with long yellow setae.
Habitat: Ontario, Michigan.

Holotype, ♂, E. K. Warren Preserve, Berrien Co., Michigan, July 17, 1920 (J. S. Rogers); No. 69. *Allotopotype,* ♀, No. 68. *Paratopotypes,* numerous ♂ ♀, July 7–18, 1920; Nos. 16, 18, 20, 22, 29, 43, 51, 54 and 68; July 9, 1922; No. 80. *Paratype,* ♂, Bothwell, Ontario, June 13, 1925 (G. S. Walley), in the Canadian National Collection.

This very interesting crane-fly is named in honor of Mrs. J. Speed Rogers.

Limnophila (Ephelia) vernata n. sp.

Size small (wing under 6 mm.); wings with an abundant spotted and clouded pattern, including a series of pale clouds along the length of cell *2nd A*; male hypopygium with the outer dististyle compressed, gently widened distally, broadest just before the tip.

Male.—Length, 4–4.3 mm.; wing, 5–5.5 mm.

Female.—Length, 5.3 mm.; wing, 5.8 mm.

Rostrum and palpi dark. Antennae relatively long, scape dark brown; flagellum obscure yellow, especially the basal segments; in cases the flagellum is more uniformly darker yellowish brown. Head dark brownish gray.

Mesonotal praescutum gray, variegated with narrow brown stripes and a few dots on the interspaces, the sublateral stripes narrowly confluent with the intermediate stripes behind the pseudosutural foveae; lateral stripes occupying the margins of the sclerite. Pleura gray, variegated with brown. Halteres yellow, the knobs dark brown. Legs with the coxae gray, variegated with brown; trochanters obscure yellow; femora obscure yellow, the tips narrowly and indistinctly darkened; tibiae and tarsi brownish yellow, the outer tarsal segments darker. Wings subhyaline, abundantly spotted and clouded with brown; a series of two or three clouds between the one at *h* and the large mark at the tip of Sc_1, the second of these markings at the origin of *Rs*, the third mark sometimes lacking; largest costal marking the stigmal blotch, confluent with the markings at the fork of R_{2+3}; abundant pale brown spots and dots in all the cells, including a series of four or five in cell *2nd A*; veins darker brown. Venation: Sc_1 ending just before the fork of *Rs*; *Rs* long, in alignment with R_{2+3}; *r* less than its own length beyond the fork of R_{2+3}; cell M_1 about as long as its petiole.

Abdomen reddish brown, the caudal margins of the segments darker brown, the hypopygium somewhat brighter. Male hypopygium with the outer dististyle (Fig. 5) about as in *L.* (*E.*) *serotinella* but gently widened distally, broadest opposite the level of the subapical spine; subapical spine slender, straight; apical spine a little stouter and gently curved.

Habitat: North Carolina.

Holotype, ♂, Guilford College, Guilford Co., April 15, 1918 (J. S. Rogers); No. 46. *Allotopotype,* ♀. *Paratopotypes,* 2 ♂ ♂.

Limnophila vernata is one of the smallest species of the subgenus so far discovered. In its abundant dotted wing-pattern, the fly bears a superficial resemblance to *Dicranophragma.*

Subgenus PHYLIDOREA Bigot.

Limnophila (Phylidorea) epimicta n. sp.

General coloration of the thorax shiny reddish brown, the praescutum with a narrow dark brown median vitta; pleura largely dark brown; antennae brownish yellow; legs yellow; wings tinged with brown, the veins seamed with darker brown; a sparse spotted dark brown pattern, especially evident on the cephalic portion of the wing.

Female.—Length about 10 mm.; wing, 10.3 mm.

Rostrum brown, the palpi dark brown. Antennae obscure brownish yellow throughout; basal segment of scape relatively short; basal flagellar segments larger, the outer segments linear; verticils relatively conspicuous, much exceeding the segments. Head brown, somewhat pollinose.

Mesonotal praescutum shiny dark reddish brown with a narrow dark brown median vitta; lateral stripes indistinct; scutum dark reddish brown; scutellum brownish testaceous, darker medially; postnotum dark reddish, pruinose medially. Pleura generally dark brown, this color more evident as a transverse girdle on the anepisternum and sternopleurite, the pteropleurite paler. Halteres obscure yellow. Legs with the coxae obscure yellow, the fore coxae darker; trochanters obscure yellow; remainder of legs yellow, the extreme tips of the femora and the terminal tarsal segments darker. Wings with a strong brownish tinge, especially on the basal third, the costal region and wing-base brighter yellow; longitudinal veins conspicuously seamed with darker brown; a longitudinal obliterative line in cell R, crossing cell *1st* M_2 into cell M_3; small, still darker brown spots at origin of Rs; Sc_2; along cord and outer end of cell *1st* M_2; fork of R_{2+3}; and the tip of R_1, including also r; the two last-described spots form the two ends of the otherwise yellow stigma; tips of veins R_2, R_3 and R_{4+5} with brown spots; veins dark brown, C and R paler, Sc light yellow. Venation: Sc relatively short, Sc_1 ending just beyond the fork of Rs, Sc_2 at its tip; Rs relatively short, angulated and indistinctly spurred at origin; R_{2+3} short, approximately equal in length to the slightly more arcuated basal deflection of R_{4+5}; r at tip of R_1 and near midlength of the sinuous R_2; cell M_1 a little longer than its petiole; m–cu beyond midlength of cell *1st*

M_2; vein *2nd A* strongly sinuous; anterior arculus preserved.

Abdominal segments brownish black, the caudal margins narrowly paler. Ovipositor and genital segment orange; tergal valves of ovipositor elongated, rather strongly upcurved.

Habitat: Florida.

Holotype, ♀, University of Florida Farm, Alachua Co., April 12, 1922, at light (Musselwhite). Sent by Professor Rogers.

Limnophila epimicta is an isolated species that seems to be correctly placed in the subgenus *Phylidorea.* The wing-pattern is different from any species of the genus known to the writer.

Limnophila (Phylidorea) osceola n. sp.

Size small (wing under 7 mm.); legs obscure brownish yellow, the terminal tarsal segments darker; wings with a strong brownish yellow tinge, the stigma indistinct; abdomen brownish yellow, without a dark subterminal ring.

Male.—Length about 5.8 mm.; wing, 6.5 mm.

Female.—Length about 6 mm.; wing, 6 mm.

Male. Rostrum and palpi dark brown. Basal segment of antenna dark, the remainder of the organ light brown; flagellar segments passing from globular through short-oval into oval, the outer segments slender. Head dark gray, clear silvery-gray in front, with a blackish spot on either side behind.

Mesonotum shiny dark ferruginous to castaneous. Pleura with a sparse pruinosity. Halteres pale, the knobs a little darkened. Legs with the coxae shiny reddish ferruginous, the fore coxae darker; trochanters yellow; remainder of the legs obscure brownish yellow, the terminal tarsal segments passing into black; legs long and slender, especially the hind legs. Wings with a strong brownish yellow tinge, the base and costal region clearer yellow; stigma indistinct; veins a little darker than the ground-color. Venation: Sc_1 ending about opposite one-third R_{2+3}, Sc_2 at its tip; *Rs* short; *r* on R_2 at from two-fifths to one-third the length; cell M_1 about equal to its petiole; *m–cu* varying from before to beyond mid-length of cell *1st* M_2.

Abdomen brownish yellow, without a dark subterminal ring. Male hypopygium with the outer dististyle relatively short, the tip blackened, shallowly bifid, the outer spine acute. Inner dististyle shorter, the basal portion broader, the apical portion gently curved. Branched gonapophyses with the arms of moderate length only, one broader and a little shorter than the other, both pointed at tips.

Female. The type female agrees closely with the male except in the non-pruinose head where the bloom is apparently destroyed by moisture. The general coloration of the thorax is more yellowish and the legs are notably shorter and stouter. Abdomen dark-colored, probably discolored by eggs within.

Habitat: Florida.

Holotype, ♂, Tallahassee, Leon Co., April 23, 1924 (J. S. Rogers); No. 1. *Allotype,* ♀, T. 3 S, R. 15 E, Suwannee Co., April 28, 1924 (J. S. Rogers); No. 3.

This very small species suggests *L. lutea* Doane in its general coloration but is readily distinguished by the structure of the hypopygium.

Limnophila (Phylidorea) persimilis n. sp.

General coloration of the thorax ferruginous; antennal flagellum yellow; fore femora (♂) brownish black, the bases obscure yellow; remaining femora brown with the pale bases a little more extensive; in the ♀ the femora and tibiae are uniformly pale yellow; wings pale yellow, only the apex very weakly infuscated.

Male.—Length, 6.5–7 mm.; wing, 6.5–7.5 mm.

Female.—Length, 8–9 mm.; wing, 7.8–9 mm.

Male. Rostrum and palpi dark brown. Antennae with the first segment dark brown, remaining antennal segments pale yellow, only the extreme outer flagellar segments weakly infuscated. Head light silvery gray, the vertex behind with an extensive darker area on either side.

Pronotum infuscated above, the sides broadly paler. Mesonotal praescutum shiny ferruginous to brownish ferruginous, more intense medially, paling into yellowish on the sides; scutellum more yellowish. Pleura and postnotum ferruginous, the color dulled by a very sparse microscopic pruinosity. Halteres pale, the knobs weakly infuscated. Legs with the coxae and trochanters pale ferruginous yellow; male with the fore femora brownish black, the basal quarter yellowish; apex of fore femur narrowly obscure yellow; middle and hind legs brown with nearly the basal third obscure yellow; tibiae dark brown, their bases paler; tarsi dark brown. Wings with a pale yellowish tinge, only the apex in cells R_2 to *1st* M_2 weakly infumed; stigma pale, distinct as a small pale brown spot beyond *r*. Venation: Sc_2 much longer than Sc_1, the latter lying shortly before the fork of *Rs*; *Rs* angulated and spurred at origin; *r* at tip of R_1 and shortly before midlength of R_2; *m–cu* shortly beyond midlength of cell *1st* M_2.

Abdomen obscure yellow, the extreme lateral margins narrowly darker. Male hypopygium of the general type of *L.* (*P.*) *consimilis* Dietz, differing as follows: Outer dististyle much broader, only the tips weakly infuscated. Gonapophyses slender, the bifid pair with the arms slender, nearly equal in length, divided almost to their bases. Aedeagus relatively short, slender, entirely blackened.

Female. In the female, the femora and tibiae are uniformly pale yellow, the tarsi passing into dark brown.

Habitat: Indiana.

Holotype, ♂, Hanover, Jefferson Co., June 2, 1922 (J. S. Rogers); No. 70. *Allotopotype,* ♀. *Paratopotypes,* 3 ♂ ♂, 1 ♀.

This species was first sent to me as *L.* (*P.*) *lutea* Doane, which it resembles rather closely in general appearance but is readily separated by the structure of the hypopygium. The holotype is retained in the writer's collection.

Limnophila (Phylidorea) adustoides n. sp.

Male.—Length, 9–9.5 mm.; wing, 11 mm.

Female.—Length, 10–14 mm.; wing, 10.5–13 mm.

Bearing a strong superficial resemblance to *L.* (*P.*) *adusta* O. S. but more closely related to *L.* (*P.*) *auripennis* Alex. and allied forms, in the structure of the male hypopygium.

Antennal flagellum light yellow, the basal segment of the scape dark brown. Mesonotum and pleura shiny ferruginous. Legs with the femora yellow, narrowly tipped with black; tibiae yellowish brown, the tips narrowly darkened; tarsi passing into black. Wings with a strong yellow suffusion, the base and costal margin clearer yellow; wing-tip broadly darkened; stigma oval, dark brown, well-defined; a very narrow brown seam along the cord; the space between the branches of *Cu* suffused with brown; veins obscure yellow, clearer yellow in the costal and basal portions, darker along the cord. Venation: *Rs* angulated and short-spurred at origin; *r* at near two-fifths the length of R_2; cell *1st* M_2 small. Abdomen obscure brownish yellow, with a subterminal black ring in the male; hypopygium dark ferruginous. Male hypopygium with the outer dististyle nearly straight, the apical split shallow, the outer spine small. Branches of the forked gonapophyses black, unequal in length. Aedeagus black, slender, about as long as or only a little longer than the forked gonapophyses.

Habitat: Indiana, Tennessee.

Holotype, ♂, Allardt, Fentress Co., Tennessee, altitude 1,650 feet, at light, June 6, 1924 (J. S. Rogers); No. 3. *Allotopotype,* ♀, June 3, 1924; No. 73. *Paratopotypes,* 9 ♀♀, June 3–26, 1924; Nos. 39, 48, 51, 55, 56, 58, 66 and 72. *Paratypes,* 1 ♂, 4 ♀♀, Scott Co., Tennessee, May 29–30, 1922 (J. S. Rogers); Nos. 4, 5 and 7; 1 ♂, 1 ♀, Clear Fork, near Burrville, Morgan Co., Tennessee, altitude 1,200 feet, at light, June 19, 1922 (J. S. Rogers); No. 6; 1 ♀, Hanover, Jefferson Co., Indiana, June 3, 1922 (J. S. Rogers); No. 71.

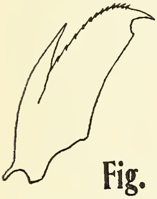
Fig. 1

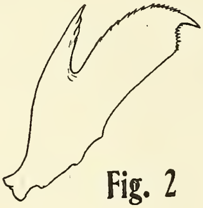
Fig. 2

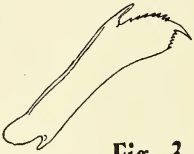
Fig. 3

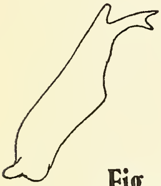
Fig. 4

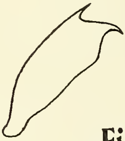
Fig. 5

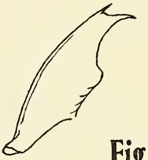
Fig. 6

EXPLANATION OF THE TEXT-FIGURES.

Outer dististyle of male hypopygium of species of the subgenus *Ephelia* in Eastern North America. All drawings made to scale.

Fig. 1. *Limnophila* (*Ephelia*) *johnsoni* Alex.
Fig. 2. *L.* (*E.*) *aprilina* O. S.
Fig. 3. *L.* (*E.*) *irene* n. sp.
Fig. 4. *L.* (*E.*) *solstitialis* Alex.
Fig. 5. *L.* (*E.*) *vernata* n. sp.
Fig. 6. *L.* (*E.*) *serotinella* Alex.

EDITORIAL.

Strange Manifestation in an Entomological Editor.

This editor is modest!

(Loud and scornful mirth from the groundlings.)

Indeed, 'tis so!

" And he shows it by a liberal sprinkling of his very minor opera through the scant pages of his publication."

Not so fast, kind friends. A page half filled costs just as many dollars and cents as one complete, entire and perfect. Moreover, a full page has a more finished look than one with a blank lower half or three-quarters.

And having to fill space, the editor must sternly repress his retiring desires and write the requisite lines.

If one could only " Tap on the bally X; and there you are!" But unfortunately, in entomology, X means nothing, whatever significance it may have in higher mathematics or amativeness. Hence, it becomes necessary to use the full keyboard in significant combinations.

Or, in plain song, as it were, the editor hates to do it, but if no one else will, he *must.*

And dismissing the frivolous air and the quotations of doubtful classicism, we seriously ask our friends and readers for minor contributions—anything new or of perennial interest—from one line in length up.

We all know that

" Little drops of water,
Little grains of sand;
Make the mighty ocean
And the beauteous land."

And every one of these little grains of knowledge we add to our science eventually helps to form the solid earth of rounded and established fact, each bit falling into its place and adding to and perfecting the harmony of the whole. It is on these minor and repeated observations and reports of facts scattered here and there through the journals that the synthetic minds erect a solid structure of tenable generalizations. Darwin is our classic example of such a mind.

Not all of us are called to be Darwins, but each within his scope can furnish the authentic data toward establishing some great general truth.

And this I conceive to be a highly useful and important function of our technical journals—to give circulation and an audience to discrete minor observations, which, as isolated facts may have interest but no great importance, yet which, combined and coordinated by an organizing mind, may become the solution of some problem; or may alone act as catalysts to seemingly unrelated phenomena, to bring them into just and harmonious relation.

In the vastness of the Cosmos, the finite becomes infinitesimal, whatever its magnitude; and all finites therefore are of equal value in the infinite, which they make up in detail.

Each note or observation, however small it may be, represents worthy effort and deserves recognition. So, will our minor lights—if any there be—take this to heart, each personally to himself? And having so taken it to heart, will they not bring their lights out from under the bushel of modesty and set them on the hilltop of publicity?

The Editor gladly abdicates in their favor.

J. R. T. B.

ENTOMOLOGICA AMERICANA.

Our revived journal has thus far published two numbers. The third, containing a revision of *Curculio* (*Balaninus*) by Dr. F. H. Chittenden—the last editor of the first series—is now in press and should reach subscribers a few days after this. The fourth number, to complete Vol. VII, will follow immediately. We shall offer our readers either an extensive monograph on Siphonaptera or an ecological study of bumble-bees. We will thus have presented four different aspects of the study of insects, in three orders—embryology, taxonomy, biology and ecology.

Owing to the limitations of size and quality we have imposed on articles, offerings of MSS have not been numerous. We accordingly invite them. We purpose to publish in *Entomologica Americana* significant papers only.

We also solicit subscriptions, which, indeed, we must have. In order to maintain our stated intention to publish about 200 pages in each volume, we need a subscription list of not less than 150 to enable us to meet the cost. We have so far about half this requisite number. We are in hopes that by the beginning of the new volume we will have reached or passed this needed number of subscribers.

As we also stated in our preliminary announcement, *we are limiting our edition to 200 copies;* complete sets will be correspondingly *difficult to obtain* and correspondingly *high in price.*

Institutional libraries particularly should subscribe before this first volume is exhausted.

SUBSCRIBERS PLEASE READ THIS!

This BULLETIN has pursued a most liberal policy toward its subscribers since it resumed publication in 1912. Where other journals cancel subscriptions not paid by the first of the year, we continue our subscribers, sometimes for long periods. We know that eventually we will receive these belated subscriptions. We now find that these arrears amount to a sum such as would enable us to enlarge this publication by at least one hundred pages and several plates. Accordingly, we ask all our belated subscribers to favor us with their arrearages as soon as possible.

And further, the United States Post Office regulations compel us to have not to exceed 10 per cent. of unpaid subscriptions, in order to enjoy second-class postage rates. This is also commended to the notice of absent-minded subscribers, for the Post Office may insist at any time that we cut them off.

With this number we enclose the regular subscription slips. Please use them. But of course not, if you have already sent in your 1927 subscription to the Treasurer.

BOOKS.

The Arcturus Adventure, by William Beebe (Putnam's, New York. $6). The under-sea world, as Dr. Beebe sees it through the windows of his diving helmet, is a world of radiant colors in the amber glow of sunlight sifting through waters; a world of shattered glowing prisms, ever moving, ever changing. The fishes, so dull, so dingy as they lie dead on a hostile land, are as flashing rainbows in their usual haunts. His descriptions of the flowing under-sea landscape at times rise to sheer poetry of color.

Adventure, of course, is subjective; and every moment of daily life on the Arcturus was an adventure; it was no day by day toilsome routine of stodgy tasks stodgily done, but a series of high moments of discovery and triumph, of beauty and joy.

And here we see in Dr. Beebe the type of the adventurous man of science, to whom every bit of knowledge coaxed or wrested from the universal mind is endued with the colors and joys and triumphs of conquest. His pen grows surer, the word more apt, the texture more smooth, but ever he unfolds a chapter—a vivid chapter—in the Odyssey of science. He gives an example of scientific exactness clothed in the attractions of style—not the usual dull and uninspired turgid verbosity of our regulation polysyllabic scientific articles. We have here at last a capable scientist able to write charmingly and in good English without sacrificing the scientific value of his subject.

Now, be it said, The Arcturus Adventure is not a ponderous text and source book of exact technical scientific fact. It does not set out to be that; its successful aim is to coordinate the narrative of a scientific expedition and to bring out for the cultured non-professional reader the unity of nature, for one thing; and the general story of its activities in the waters of the ocean, both above and below. The story ranges from high-soaring frigate birds, specks in the far sky, to miniature monsters, who carry their own lighting systems to pierce the eternal gloom of the cold sea deeps.

This does not purport to be a critical examination of the work. It rather points out its beauties. As for its contents, they range from volcanoes springing into sudden existence to nuzzling sharks looking on the human intruder from incurious eyes. The whole of living nature passes in etched review before our eyes, from man down, through life in its protean disguises, to the most inconsidered of sea-beasties, infinitesimal in size and infinite in number. Here and there an insect appears for an instant in the picture, to be lost among the other thronging living things. *Halobates,* the oceanic water-strider and its breeding habits are mentioned (p. 62), confirming the published observations of Witlaczil, Stamm and Lundbeck.

Other insects mentioned are *Callidryas eubule* Linn. and *Historis orion* Fabr.

A book, this, to be read and savored by everyone who feels the joy of life on the open road or the flowing sea, in meadow or in woodland; and by no means the ex cathedra pronouncement of some stuffed prophet of science, but rather the golden words of one who knows; and who, knowing, vividly imparts some living portion of his knowledge to kindred spirits.—J. R. T. B.

Insects of Western North America, by E. O. Essig. (The Macmillan Co., New York. $10.)

In this truly fine work, Dr. Essig has done for insects as a whole what has been done for individual orders; and he has done it well. It is indeed not possible within the compass of one volume to treat adequately and completely of every order and every species in it. Alas! that is impossible even in the case of many families within the orders. But he has given a comprehensive view of the whole class in a manner not thus far attempted. His book is more in the nature of a hand-book than of an introduction. It starts practically where Comstock's Manual and Introduction and Imms's Text Book leave off; and in its field ranks certainly with these three standard works.

A complete review and criticism of this important book in the space and time available are out of the question, but we may give an idea of its scope and character by referring to the Hemiptera, with which we have some slight acquaintance. Each order is allotted a chapter; that on Hemiptera (= Heteroptera) is numbered XXII. It succinctly defines the family and gives a full page figure of external anatomy drawn from *Leptocoris trivitatus.* It also refers briefly to general life-history and means of economic control where needed. A key to families follows. The families are then taken in detail, beginning with the Scutelleridae. Under each family one or more species of common occurrence are mentioned and tersely characterized. Figures of representative species are given; these are either from photographs or from adequate line drawings, all excellent. This plan is followed throughout all the orders.

There are three indices—Author's, Host Plants and Subjects, filling 125 pages out of 1035. The figures number 766.

As a book, it maintains the Macmillan Company's high standards; the typography is excellent, the figures clear and the presswork fine. It is well-bound in cloth; and has the very desirable quality of staying open and as flat as possible in such a big book, at any page.

It should have a place in every entomologist's library.

J. R. T. B.

Note on Occurrence of Fitchia aptera Stål (Hemiptera. Reduviidae).—The following note on an interesting capture of *Fitchia aptera* Stål was prepared at the request of Mr. J. R. de la Torre Bueno, who so kindly identified the specimens for me.

On April 6, 1926, before the frost had entirely left the ground and while in search for such hibernating Coleoptera with which luck and circumstances might favor me, it was my fortune to uncover a number of these striking insects. A few miles outside of Conyngham, Luzerne Co., Penna., in an open uncultivated field sparsely overgrown with scrub-pine, a small heap of apparently new but discarded shingles was noted. Fourteen specimens were taken clinging to the under surface of the outermost of these shingles lying next the ground, occurring in groups of two to four and singly and making no effort to escape. This sluggishness I attributed to the cool weather then prevalent. Six additional specimens were taken on April 10. On both occasions a careful search was made under nearby stones and débris but the shingles only were productive.—W. L. HUTCHISON, Conyngham, Pa.

PROCEEDINGS OF THE SOCIETY.

Meeting of October 15, 1925.

A regular meeting was held at the Brooklyn Museum, October 15, 1925, at 8.25 p. m., with President Davis in the Chair and eight members present and one visitor.

Mr. Bell proposed for membership Mr. Edgar Irving Huntington.

Mr. Davis spoke of his visit to Mrs. Slosson, when he conveyed the Society's congratulations on the occasion of her birthday.

Mr. Bell showed specimens collected at Flushing during the past summer, among which were a specimen of *Zerene caesonia* Stoll, *Eurymus philodice* ab. *rothkei* Reiff, and *Eurymus eurytheme* form *amphidusa* Boisduval.

Mr. Engelhardt spoke briefly of his experiences during his trip to the Western States, showing several photographs of points of interest, including some of the earthquake damage in Santa Barbara, California; he also told of his visit with Mr. Fred Winters, a former member of the Society, now living in Santa Barbara, and of the great hospitality with which he was received, and of Mr. Winters's desire that he express his best wishes to the members of the Society at this meeting. Mr. Engelhardt showed specimens collected in one day during his trip, which completely filled a good size box, numbering several hundred specimens, and spoke of the immense numbers of moths and other insects which came to light. He also showed specimens of moths collected by Mr. Bell in Alabama, Connecticut and on Long Island, including a pair of *Isoparce cupressi* Boisduval, the cypress sphinx, taken at Mobile, Alabama.

Mr. Torre-Bueno reported that he had found collecting poor during the summer but that in late August had taken 10 specimens of the rare winged form of *Rheumatobates rileyi* Bergr.

Mr. Levine spoke of his experiences in Mexico and the southwest and on shipboard. Mr. Sheridan spoke of his trips with the Torrey Botanical Club. Mr. Doll did little collecting, and found it rather poor.

Mr. L. W. Anderson showed photographs which he had taken of the head of *Vanessa antiopa* caterpillar and the scales of the wings of adults of that species and also of the caterpillars of other species of Lepidoptera. Mr. Schaeffer had done but little collecting, but had spent a little time at Lakehurst, N. J., and Yaphank, L. I. He told of several specimens of *Donacia emarginata* Kirby being taken on pine at Lakehurst, an unusual place to find *Donacia.* He also showed specimens taken by Mr. Engelhardt on his western trip and three new species of *Cassidinae* taken by Mr. H. P. Löding, of Mobile, Ala., these being the first new species in this genus to be turned up for a long while.

Mr. Davis reported that he had collected the grasshopper *Melanoplus differentialis* Thomas on Staten Island on October 8 and remarked on this species.

Meeting of November 12.

A regular meeting of the Society was held at the Brooklyn Museum on November 12 at 8.20 p. m., with President Davis in the Chair and 10 members present, also two visitors, Mr. Carl Rungius, the celebrated artist, and Dr. N. Boradin.

Mr. E. Irving Huntington's proposal for membership was acted upon, it being duly moved and seconded that the Secretary cast one ballot for the election of Mr. Huntington, which was accordingly done. Mr. Davis proposed for membership Mr. and Mrs. Raymond L. Taylor.

Mr. Doll proposed for membership Mr. Louis W. Anderson, 565 Prospect Avenue, Bronx, N. Y. Mr. Anderson being present, it was regularly moved and seconded that the By-Laws be suspended and that the Secretary cast one ballot for the election of Mr. Anderson, which was done.

Mr. Engelhardt showed a specimen of the large African beetle, *Goliathus giganteus,* collected by Mrs. Carl Akeley, in the Congo region, Africa, and brought home wrapped in a handkerchief, in practically perfect condition.

Mr. Carl Rungius showed specimens of butterflies and moths collected at Banff, Alberta, Canada.

Mr. Engelhardt spoke of his visit to Banff and Lake Louise, Alberta, Canada, June 27 to 30 of the present year. At Banff he spent two days of mountain climbing and collecting, accompanied by his artist friend, Carl Rungius, whose summer studio is located near that town. At Lake Louise a day was devoted to climbing one of the nearby mountains above timber line. Variable weather conditions interfered with collecting, but nevertheless a fair representation of specimens was obtained.

Quite common in valley meadows and open glades among the timber were *Argynnis atlantis* and *eurynome* var. *clio, Erynnis* *christina, Phyciodes pratensis, Synchloe lotta, Pontia frigida, Agriades podarce, Parasemia plantaginis.* Just below timber line were captured *Anarta cornigera* and *Polia secedens* and above timber line *Anarta melonopa.* A small collection of Coleoptera included *Buprestis nuttali, Strangulepta pubera, Judalia instabilis, Acmaeops pratensis, Asemum atrum,* all of which were common while rarer species appeared to be *Leptura praestans* and a species of *Callidium,* considered by Mr. Schaeffer as new.

Mr. Wm. T. Davis exhibited 5 species of Cicadas collected during an automobile trip in Oregon and California by Mr. Geo. P. Engelhardt and Lieut. W. J. Chamberlin in July, 1925. The species were 13 specimens of *Tibicen apache* Davis, collected along irrigation ditches at Holtville, Imperial Valley, Calif.; 8 *Okanagana bella* Davis, Green Spring Mt., Oregon; 2 *Okanagana occidentalis* Walker, Green Spring Mt., Oregon; 2 *Okanagana tristis* Van D., Baker Co., Oregon, and Modoc Co., Calif.; 1 *Okanagana oregona* Davis. Green Spring Mt., Oregon. In addition to these Mr. Engelhardt collected in Arizona two females of the straw colored *Okanagodes gracilis* Davis, at Temple; a single *Tibicen apache* at Phoenix, and at Kansas City, Kan., a male *Tibicen marginalis* Walker that flew at night to a trolley car.

MEETING OF DECEMBER 10.

A regular meeting of the Society was held at the Brooklyn Museum, on December 10 at 8.12 p. m., with President Davis in the chair and 12 members present, also one visitor.

Mr. and Mrs. Raymond L. Taylor's applications for membership were next acted upon, it being moved and seconded that the Secretary cast one ballot for their election; which was accordingly done.

Mr. Davis read a letter to the Society announcing a contribution of $250 for a publication for longer papers. Mr. Torre-Bueno spoke of the difficulty experienced by authors of papers of fifty pages or more in getting their papers published, and said that this money was to be used in getting out a publication, separate from our BULLETIN, in which these longer papers would be published and for which it was expected that we would get subscribers.

Mr. Engelhardt moved that this matter be referred to the Publication Committee for further action, motion duly carried.

Mr. Davis appointed the following members as a Nominating Committee: Messrs. Engelhardt, Schaffer and Sheridan.

Mr. Davis reported the death of Mr. L. B. Woodruff and gave a short account of his activities; it was moved and seconded that the Secretary express to the nearest relative the regret of the Society, which was done.

Mr. Engelhardt reported the death of Mr. J. C. Wright, on November 2, 1924, and gave a short account of his life and activities; Mr. Wright was not a member of the Society but a frequent visitor to the Museum and his collection of insects was donated to the Museum by one of the family.

Mr. Sheridan spoke of a pond near the Queen's Road, in the vicinity of the Bellaire station of the Long Island Railroad, in which is found a rare species of Rotifer, *Octotrocho speciosa,* and said that as the pond is located on a tract that is proposed for a park, some means of preserving the pond should be made, as efforts to introduce this species of Rotifer into similar ponds have failed.

Mr. Schaeffer reported specimens of *Pantomorus fulleri* Horn, Fuller's rose-beetle, an imported beetle, taken in the green-houses of the Brooklyn Botanic Gardens, probably the first Long Island record of this beetle.

Mr. Davis showed a box, containing many specimens of the nests, adults and parasites of the wasp *Eumenes fraterna* Say, and spoke briefly about them. He also read from Hancock's "Nature Sketches in Temperate America," an account of their habits, etc.

Mr. Engelhardt spoke of the greatly reduced numbers of the cocoons of the large Saturnid moths; the members discussed the reasons for the gradual disappearance of the various species and offered several theories therefor, viz., automobiles, over-collecting of the cocoons, the trees in the city streets and parks dying, burning of the woods and fields and the gradual reduction of their food plants through the clearing of woods, fields and hedges for building operations.

Mr. Hunter said that he expected to be away from New York for a period of years and offered his resignation as a member of the Society, which was not accepted and he was given a leave of absence for such time as he was away, without dues, his membership to remain in good standing.

Mr. Engelhardt related his experiences on a collecting trip to the coast of central Oregon in company with Mr. B. G. Thompson, of the Agricultural College at Corvallis, Ore., during July of the past summer. Headquarters were made at the home of High School Principal J. E. Davis in the small town of Waldport, at the mouth of the Alsea River. During the drive from Corvallis to the coast, a distance of about sixty miles, a drop in the temperature from 95° to 50° was encountered and heavy sweaters or overcoats were worn. At night the temperature dropped to near freezing point. Under these conditions naturally very few insects were active, and the collections made were obtained by turning logs, sifting, heating and sweeping. *Cicindela bellissima,* a species restricted to the Oregon coast, was found fairly abundant locally in places between the beach and sand dunes. Other interesting beetles included *Platycerus laticollis, Neodyalis laevicollis, Dyschirius obesus* and *Promecognathus laevissimus crassus,* the latter not uncommon under fallen tree trunks in a primeval forest at Hecceta Light. Special search was made for the pupae of *Vespamina sequoia,* found in the exuded pitch of a species of scrub pine back of the beach at Waldport. A dozen or more secured after a day's hard work were placed on top of a stove with the tin can containing them, when someone took a notion to light a fire, neglecting to remove the tin can until the pupae were thoroughly baked. Other incidents referred to were as to troubles along the rugged, picturesque coast where breeding places of cormorants, puffins and gulls were investigated and an attempt was made to enter the refuge of a colony of Stellers's sea lions in an ocean cave at the base of a precipice.—E. L. Bell, Secretary.

EXCHANGES.

THE MUSEUM of the Brooklyn Institute has a few uncolored sets of the Calverly, Weidenmeyer and Edwards plates of North American Sphingidae for exchange or for sale at $5 per set. Address, Librarian, Brooklyn Museum, Eastern Parkway, Brooklyn, N. Y.

LEPIDOPTERA from the Mountains of Kentucky. Papilios and other var. of this section collected. Paper spec. of *Xylophanes tersa* and *Catopsilia Eubule* on hand. Also Cocoons of the larger Saturnid moths. Ellis Chandlee, Barbourville, Ky.

FOR EXCHANGE.—Fine 24-drawer cabinet. F. M. Schott, 24 Stanhope Street, Brooklyn, N. Y.

This one page is intended only for wants and exchanges, not for advertisements of articles for sale. Notices not exceeding THREE lines free to subscribers. Over lines charged for at 15 cents per line per insertion.

Old notices will be discontinued as space for new ones is needed.

BUTTERFLY COLLECTORS.—Have you aberrations or freak butterfly specimens for sale or exchange? Professional and private collectors please write. Jeane Gunder, Pasadena, Calif.

NEW ARRIVALS.—From Colombia, French Guiana, and Brazil. Brilliant tropical Lepidoptera for scientific and decorative purposes. H. S. Parish, 14 Briarcroft Road, Toronto, Ont., Canada.

CYNIPIDAE.—Galls and bred wasps wanted to determine or in exchange. Alfred C. Kinsey, Indiana University, Bloomington, Indiana.

WANTED.—Am studying the bionomics of the corn billbugs and desire the privilege of examining *Calendra* (*Sphenophorus*) from all parts of the world. A. F. Satterthwait, U. S. Entomological Laboratory, Webster Grove, Mo.

WANTED.—Pentatomidae, Cydnidae, and Scutelleridae from all parts of the United States for determination or exchange. Dayton Stoner, State University of Iowa, Iowa City, Iowa.

DIURNAL LEPIDOPTERA.—Have many desirable western species to exchange, including *Argynnis atossa, macaria, mormonia, malcolmi, nokomis; Melitaea neumoegeni; Lycaena speciosa;* etc. Send lists. Dr. John A. Comstock, Southwest Museum, 4699 Marmion Way, Los Angeles, Calif.

WANTED.—Ants from all portions of the United States for determination or exchange. Will also exchange other insects for ants. M. R. Smith, Assistant Entomologist, State Plant Board, A. and M. College, Miss.

Vol. XXII APRIL, 1927 No. 2

BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

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MAY 2 1927
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E. L. BELL GEO. P. ENGELHARDT

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Meetings are held on the second Thursday after the first Tuesday of each month from October to June, inclusive, at the Central Museum, Eastern Parkway and Washington Ave., Brooklyn. The annual dues are $2.00.

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BULLETIN
OF THE
BROOKLYN ENTOMOLOGICAL SOCIETY

Vol. XXII April, 1927 No. 2

THE LIFE HISTORY OF THE CREEPING WATER BUG, PELOCORIS CAROLINENSIS BUENO (NAUCORIDAE).

By H. B. Hungerford, Department of Entomology, University of Kansas, Lawrence, Kansas.

The above-named bug is the only representative of the family Naucoridae reported for Kansas. It has been taken several times from some pools near Coldwater, Kansas, but has not been found elsewhere in the state. I have previously reported the first collection which consisted of a long series of this insect taken by Mr. Beamer and his entomological survey party on July 28, 1916. They found these insects in a series of spring-fed pools in the bed of an intermittent stream. These pools contained a thick growth of *Nitella* amongst which the bugs were living. Mr. Beamer sent me a large number of living adults and nymphs packed in the stonewort in which they were taken. About all I was able to learn concerning them at that time was that they could and did on every occasion possible "sting" most viciously, much to my sorrow. A sting by a hornet is to be preferred to the thrust of the stylets of one of these creatures. While I was able to keep them under observation for some time they died one by one without the nymphs molting or the adults depositing eggs. Since this was one family of the aquatic Hemiptera concerning the biology of which I had no first-hand knowledge, I made every effort to secure more living material. Inasmuch as Coldwater is located in the southwestern part of the state, over three hundred miles from Lawrence, it was not an easy matter to get the living bugs. Finally, Mr. Clarence O. Bare sent sixty-one specimens on September 7, 1923. These died. In April, 1925, Professor

Beamer and Mr. Bare made an automobile trip into the region and brought me a couple hundred of living adults. This time with abundant material at the proper season I was able to start a large number of rearings. The first eggs were deposited on April 14th. They were attached to a sprig of *Nitella* as shown in the drawing on Plate VI. By the latter part of May other duties made it necessary for me to turn the rearings over to Mr. Robert Guntert, our able field assistant, who by careful attention and ingenuity was able to rear the insects. Each newly hatched insect was placed in a glass Stender dish, the molting dates recorded as they occurred and the exuviae placed in a vial of alcohol. If a nymph died it was placed in the vial so that a great many nymphs and cast skins have been available for study.

On April 18, 1925, I planted a colony of twelve adults in Rock Pool, a temporary rock quarry pool east of Lawrence, Kansas, and on April 22 a similar number in a spring-fed pool on the Country Club grounds. In neither case did the insects survive.

Since these insects are fiercely predacious it was necessary to isolate each newly hatched nymph. Each specimen was placed in a tall Stender dish or jelly glass half-full of water and supplied with a sprig of *Nitella*. Mosquito wrigglers, chironomus larvae, Corixids and Entomostraca were given as food and the water replaced by fresh pond water at frequent intervals. There was something grievously wrong with the rearing technique for we succeeded in rearing to the adult stage only nine specimens from 134 isolations. In the paper on "The Life History of the Toad Bug,"[1] I published the individual records to visualize the large mortality attending that investigation. Herewith I am submitting the data in brief form. Several females were mated and isolated and deposited eggs as follows:

A. Female isolated April 13; laid 9 eggs April 14, 1 on April 15, 1 on April 16, 3 on April 17, 12 on April 25, 4 on April 27 and 14 more by May 14; a total of 44 eggs. She died June 17.

B. Female isolated April 13; laid 11 eggs April 14, 10 on April 17, 11 on April 18, 6 on April 20 and 6 on April 27; a total of 44 eggs in 14 days.

C. Female isolated April 13; laid 12 eggs April 14, 7 eggs April 15, 1 egg April 16, 4 eggs April 17, 7 eggs April 18, 13 eggs April 22 and 7 eggs on April 25. Here was a total of 51 eggs during 12 days. She continued to deposit eggs till May 14, when she was liberated.

---

[1] Hungerford, H. B., The Life History of the Toad Bug, *Gelastocoris oculatus* Fabr. (Gelastocoridae), *Kansas University Science Bulletin*, Vol. XIV, pp. 145–167, 1922.

D. Female isolated April 13; laid 10 eggs on April 22, 6 more on April 27 and then died.

E. Female isolated April 13; deposited 8 eggs on April 14, 4 eggs April 17, 7 eggs April 18, 3 eggs April 20, 16 eggs April 22, 5 eggs April 25, 10 eggs April 27; a total of 53 eggs in 14 days. Then she was transferred to a larger jar where she continued to deposit eggs for some time.

G. Female isolated April 13; deposited 2 eggs April 16, 2 eggs April 17, 6 eggs April 18, 3 eggs April 20, 8 eggs April 22, 7 eggs April 25 and thereafter laid no more eggs; a total of 28 eggs.

The majority of the eggs recorded above showed red eye spots by May 14. The incubation period varied from 32 to 45 days, with the majority requiring 39 to 40 days, as shown in the table below. By the time the eggs were ready for hatching the plant sprigs to which they were attached were dead and in some cases in a state of disintegration.

LENGTH OF INCUBATION PERIOD BETWEEN APRIL 14TH AND JUNE 5TH
(*Observations on 143 eggs at laboratory temperature*)

Duration in days	32	34	35	36	37	38	39	40	41	42	43	44	45
Number of eggs hatching	2	2	3	3	3	18	31	36	16	15	5	5	4

The majority of the nymphs died in the first instar. The large numbers that succumbed between the fifth and twelfth days would indicate that death might have been due to some difficulties involved in molting. One first instar nymph lived 22 days, but failed to transform. The bugs that passed the first molt successfully did so in from 9 to 14 days. The table below summarizes the records of 134 nymphs.

LENGTH OF FIRST NYMPHAL STADIUM
(*Observations on 134 Nymphs of which only 24 Passed the First Molt Successfully*)

Duration of days	1	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	21	22	Total
Number making successful 1st molt								3	1	6	5	4	4						1		24
Number dying in 1st molt															2						2
Dying still in 1st instar	1	4	4	7	5	9	6	12	15	17	7	5	3	2	3	4	1	1	1	1	108

The time required for development from the hatching of the egg to the emergence of the adult was from 50 to 62 days. The total period from the deposition of the egg to the appearance of the adult was from 88 to 102 days. The length of time required for each stage is shown in the table opposite. In this table it will be noted that two males that hatched in May, 1925, lived until August, 1926.

THE EGG.

Size: Length, 1.26 mm.; diameter, .6 mm. Like other Hemipterous eggs I have studied these eggs enlarge as the embryos develop within. By the time the Naucorid embryo is formed and rotating within the shell the length has increased to 1.5 mm. and the diameter to .8 mm.

Shape: The shape of the egg is shown in the drawing on Plate . The micropyle is about .06 mm. in length.

Color: The color of the egg is creamy white when first deposited. As the embryo develops within, the eye spots show first as pink streaks and later as red fully formed eyes.

The eggs are glued to the leaflets and stems of *Nitella* and other aquatic plants by means of a fairly generous quantity of white adhesive.

By means of the drawings on Plate VI and the measurements given below, it will be possible to identify the stages of this insect that may be taken in pond survey work.

	Length	Greatest Width	Width of Head
First instar:	2.7 mm.	1.6 mm.	1 mm.
Second instar:	3.6 mm.	2.2 mm.	1.3 mm.
Third instar:	5.2 mm.	3.2 mm.	1.7 mm.
Fourth instar:	7.1 mm.	4.4 mm.	2.3 mm.
Fifth instar:	9 mm.	5.2 mm.	2.7 mm.

The general appearance of the nymph is the same as that of the parent. The first instar form has a single segmented anterior tarsus which lacks a claw. The middle and posterior tarsi are two segmented, the first segment being very short and asymetrical, the second bearing two claws of about equal length. The middle and hind limbs are sparsely provided with natatory hairs. The antennae are three segmented, the basal segment being very short. The later nymphs agree with the first except that the antennae

Record of Nymphs that Survived One or More Molts, Season of 1925

No.	Egg Laid	Date Hatch	1st Molt	2nd Molt	3rd Molt	4th Molt	5th Molt	Sex	Days in Nymphal Stages 1st	2nd	3rd	4th	5th	Total	Remarks
A1e	April 14	May 21	June 4	June 15	June 25	July 8	July 21	♀	14	11	10	13	13	62	
A1k	April 14	May 24	June 5	June 17	June 24	July 5	July 25	♀	12	12	7	11	20	62	
B1c	April 14	May 23	June 5	Died June 15					13						
B1e	April 14	May 23	June 4	June 18	June 29	?	July 24	♂	12	14	11			62	Mated with A1e Aug. 3 Died Aug., 1926
B1g	April 14	May 23	June 6	June 14	June 21	July 3	July 14	♂	14	8	7	12	11	52	
B2a	April 17	May 24	June 7	June 18	June 25	July 5	July 21	♂	14	11	7	10	16	58	
C1a	April 14	May 22	June 4	June 15	June 23	July 6	July 17	♂	13	11	8	13	11	56	
C1g	April 14	May 22	June 5	June 15	June 22				14	10	7				
C2b	April 15	May 24	June 6	Died June 9					13						
C2c	April 15	May 28	June 8	Died June 13					11						
C3a	April 16	May 24	June 6	Died June 9					13						
C5b	April 18	May 28	June 9	June 18	June 26	July 6			12	9	8	10			
C5c	April 18	May 28	June 9	June 23	June 26	July 8	July 23	♀	12	14	3	12	15	56	
C5d	April 18	May 28	June 8	Died June 17					11						
C5h	April 18	May 30	June 8	Died June 12					9						
E1g	April 14	May 23	June 4	Died June 9					12						
E3a	April 18	May 28	June 8	Died June 10					11						
E4a	April 20	May 30	June 9	June 19	June 26	July 5	July 17	♀	10	10	7	9	12	48	
E4c	April 20	May 30	June 8	June 17	June 24	July 6	July 19	♂	9	9	7	12	13	50	Died Aug., 1926
E4d	April 22	May 30	June 12	June 27	July 14				13	15	17				
G2a	April 17	May 25	June 7	Died June 12					13						
G3a	April 18	May 28	June 11	June 21	July 11				14	10	20				
G3b	April 18	May 28	June 10	Died June 15					13						
G4f	April 22	May 3	June 12	June 19	June 25	Killed July 1			9	7	6				Eaten by Naiad of Dragon Fly

show some development of the terminal segment which in the fifth stage have a slight constriction suggesting segmentation. The large mesothoracic spiracles are located on the underside of the body just behind the anterior coxal cavities and show plainly in the later stages. Mr. J. R. de la Torre-Bueno[2] reared two specimens of *Pelocoris femorata* P. B. This species also has five nymphal instars, but came through the various stages in a shorter time than that recorded above for *Pelocoris carolinensis* Bueno. He gives the egg stages as about 24 days and the nymphal period 53 days, while the species I am reporting required about 39 or 40 days for the egg stage and from 50 to 62 days for the nymphal period. Temperature undoubtedly accounts for the difference in the lengths of the incubation period. He began his observations in June while mine were started in April. *Pelocoris femorata* P. B. is a larger insect than *Pelocoris carolinensis* Bueno according to Mr. Torre-Bueno and to be distinguished by the fact that the last ventral abdominal segment of the female is not emarginate. Mr. Torre-Bueno was kind enough to determine the Kansas species.

PLATE VI.—DEVELOPMENT STAGES OF THE CREEPING WATER BUG, *Pelocoris carolinensis* BUENO, BY H. B. HUNGERFORD.

Figure 1. Egg glued to a sprig of water plant.
Figure 2. First instar nymph.
Figure 3. Second instar.
Figure 4. Egg.
Figure 5. Antenna of fifth instar nymph.
Figure 6. Antenna of first instar nymph.
Figure 7. Third instar nymph.
Figure 8. Egg.
Figure 9. Fourth nymphal instar.
Figure 10. Fifth nymphal instar.

Note: Figures 2, 3, 4, 7, 9 and 10 are drawn on same scale.
Drawings by Miss Kathleen Doering.

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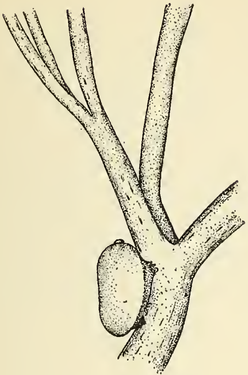
[2] Torre-Bueno, J. R. de la, Brief Notes Toward the Life History of *Pelocoris femorata* Pal. B. with a Few Remarks on Habits, *Jour. New York Entomological Society,* Vol. XI, pp. 166–173, 1903.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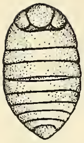
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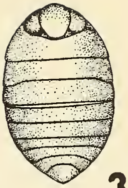
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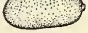
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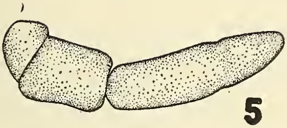
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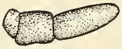
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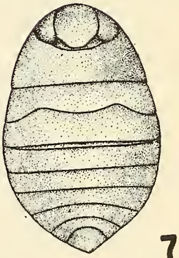
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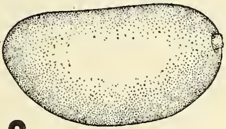
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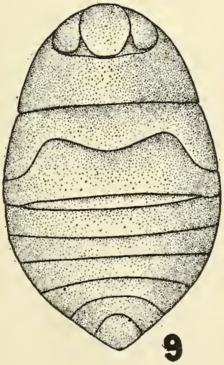
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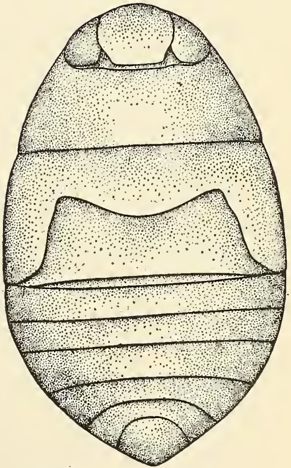
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FOUR NEW SPECIES OF VOLUCELLA (Syrphidae, Dipt.).

By C. H. Curran, Ottawa, Canada.

In the Annals of the Entomological Society of America, vol. xix, pp. 50–66, 1926, I presented a key to the species of *Volucella* known to me together with notes on Wiedemann's types. Since preparing that paper four apparently undescribed species have come to hand and I take this opportunity of describing them and indicating their positions in the key.

Volucella mustoides n. sp.

Black, with reddish yellow markings; marginal cell normal, moderately long petiolate; scutellum with transverse preapical depression. Length, 8.5 mm.

Female. Head shining reddish, the occiput and a small ocellar spot blackish. Face produced strongly downwards and very slightly forwards, with a very weak tubercle below the middle, gently concave on the upper half; facial orbits and a broad band below the antennae yellowish pollinose. Front moderately wide, gently narrowing to the vertex; frontal pile fairly long, black, elsewhere on the head the pile yellowish. Antennae reddish; third segment three times as long as wide, narrowed to beyond the middle, the apex rounded; aristal rays long and black. The cinereous pile on the eyes is short.

Pleura with a yellowish fascia behind the base of the wing, the propleura also yellow; hypopleura yellow. Humeri whitish yellow; broad sides of the mesonotum, a broad, anteriorly convex presutural fascia which is broadly connected with the pale lateral margins and the scutellum reddish yellow; a black vitta, narrowly separated from the black disc, extends backwards from the suture almost to the posterior calli. Hair black, mixed with yellow; bristles yellow, with brownish tips. The scutellar depression is pale brownish and granular.

Legs blackish; knees and basal tarsal segment reddish; hair black.

Wings hyaline, rather brownish on the apical half except behind, the crossveins narrowly clouded with brown. Marginal cell not widened. Squamae grayish brown, with brown fringe. Halteres reddish yellow, with pale yellow knob.

Abdomen shining black; second segment with a pair of very large basal, sub-oval reddish spots which are narrowed inwardly; third segment with a broadly interrupted basal reddish fascia which occupies almost the basal half of the segment towards the middle and is gradually narrowed towards the sides; fourth segment with an almost linear, broadly interrupted basal fascia, which widens towards the middle; none of the pale spots reach the lateral margins and those on the third segment are very narrowly connected along the base of the segment. Pile cinereous yellowish except on the apical half of the second segment, where it is black. Second sternite more or less reddish.

Type, ♀, Prieta, Honduras, April 5, 1924 (Dr. Jos. Bequaert), in Curran collection.

Traces to *musta* Will. in my key but is at once distinguished by the black first abdominal segment, petiolate marginal cell, etc.

Volucella cockerelli n. sp.

Head and abdomen reddish; thorax black; scutellum pale luteous; wings hyaline, with an irregular median brown fascia. Length, 18 mm.

Male. Head rusty reddish yellow; occiput black, the posterior orbits gray pollinose; face, cheeks and front shining; sides of the face and a broad band beneath the antennae, whitish pollinose. Hair of the face, upper part of the cheeks and the frontal and vertical triangles, coarse, black, bordered below on the face and cheeks with yellowish, the lower fourth of the face and cheeks bare; pile of the occiput very short, whitish; no long occipital cilia; ocellar tubercle black. Face with a very large, strong median tubercle, moderately produced downwards, deeply concave above; frontal triangle produced, not convex. Eyes touching for a short distance, whitish pilose. Antennae brownish, the third segment large, "boot-shaped," the apex almost transverse, the tip rounded; arista black, with rather short rays below, moderately long ones above.

Thorax with soft, crinkly, whitish pile, the mesonotum with coarse, longer black hairs intermixed. Humeri and rather narrow lateral margins reddish brown. Scutellum large, gently convex, translucent brownish yellow, with ten pairs of setigerous tubercles. Sides of the thorax with bristles; six prescutellars on the median half.

Legs black, clothed with short black hair; femora slender, swollen on basal third; posterior tibiae moderately arcuate.

Wings hyaline, the stigma and a broad fascia behind it, reaching to the sixth vein, brown, the wings brownish yellow between the middle and basal crossveins; marginal cell regular; fifth vein without appendage.

Abdomen dark rusty reddish, shining, the very narrow (linear) lateral border, broader ventral border, the first segment wholly, and the genitalia, black. Hair dorsally very short and appressed, black, with longer, finer cinereous hair intermixed on the fourth segment; a small anterior sublateral patch on the second and the whole of the first segment, pale pilose; lateral margins with dense, short black hair. Venter with pale pile except on the broad apex of the fifth sternite in the middle.

Type, ♂, Tingo, Perú, August 22, 1926 (T. D. A. Cockerell), in Curran collection.

Volucella vagoides n. sp.

Pale yellowish and black; no prescutellar row of bristles; no scutellar depressions; marginal cell broadly open; eyes wholly pilose. Length, 8.5 mm.

Female. Head pale greenish yellow, the occiput black except below; a broad brown stripe on the cheeks anteriorly and an obscure brownish median vitta on the lower half of the face. Face deeply concave on the upper two-fifths, with a conspicuous tubercle just below the middle, perpendicular below the tubercle, conspicuously produced downwards. Facial orbits, most of the facial depression and the occiput, whitish pollinose. Front rather wide, gently widening anteriorly. Hair of the head, including the eyes, short and yellowish. Antennae reddish; third segment elongate oval; arista luteous, with long brownish rays above and below.

Thorax pale yellowish; mesonotum strongly bluish opalescent on the median half or more, the dark color not nearly reaching the scutellum, which is tinged with brown and opalescent except the narrow border. Hair yellowish, coarse dorsally, black on the scutellum. Bristles black. Pectus rather brownish.

Legs brownish red, the tarsi more brownish except basally; hair mostly pale on the basal half of the femora, elsewhere black.

Wings with slight luteous tinge. Squamae and their fringe brown. Halteres yellow. There is a faint indication of clouding along the crossveins and apical veins.

Abdomen reddish, the first two segments pale yellowish except the apical fourth of the second, which, together with the broad, incomplete base of the third, broad apex and narrow base of the fourth and the whole of the fifth segment, is brown. Hair black except on the pale yellowish portions.

Type, ♀, San José, Costa Rica, October, 1905 (P. Biolley). The type was forwarded by Mr. D. G. Hall, and will be deposited in the U. S. National Museum.

This is evidently the species recorded by Williston in Biologia Cent. Amer., Dipt., iii, as *Phalacromyia vaga* Wied. It traces to *lugens* in my key.

Volucella correcta n. sp.

Rusty reddish, the dorsum of the thorax and abdomen largely dark; variable. Length, 9 to 10 mm.

Male. Face, cheeks and lower part of the occiput shining rusty reddish, the head elsewhere brownish; facial depression and narrow orbits thickly dark yellowish pollinose. Face produced downwards as a short, sharp cone, deeply concave on the upper third, with a large tubercle occupying the median third. Face with sparse yellowish hair, the front and occiput with yellowish hair, the latter gray pollinose. Hair of the vertical triangle and the occipital cilia, black. Upper half of the eyes flattened, with greatly enlarged facets and sparse, coarse black hair, bare on the lower half. Antennae dark reddish, the third segment two and one-half times as long as wide, gently tapering to the rounded apex; arista long and slender, with sparse, long rays, black on the apical two-fifths.

About the median third of the mesonotum is brownish or bluish opalescent although there are two more or less distinct paler vittae on the anterior half which are broadly connected in front. Hair of the mesonotum black, mixed with brownish red on the anterior half, on the mesopleura and pteropleura largely black, elsewhere yellowish. Scutellum large, prominent basally, gently convex, with six or eight fine marginal bristles, the disc rather ferruginous, the hair sparse and fairly long. There are no distinct prescutellar bristles although the hair is longer and coarser immediately in front of the scutellum.

Legs reddish, the tarsi becoming brownish apically; hair black, giving the legs a darker appearance.

Wings lightly brownish on the apical half, somewhat darker anteriorly, hyaline on basal half. Marginal cell narrow, with a fairly long petiole. Squamae brown, with brown fringe. Halteres yellow.

First two abdominal segments pale yellowish, the second broadly brownish apically, the third and fourth reddish brown, with wide, broadly interrupted basal fasciae of a more or less reddish color, sometimes mostly reddish with the apex and median vitta brown. Hair black except on the first segment and base of the second laterally.

Female. Front narrow, with almost parallel sides, polished brown or black; eyes black haired on the upper third. Abdomen wholly brown or blackish beyond the apical third of the second segment, with bluish opalescence. There may be a faint, brownish median facial vitta on the lower half and very obscure, slender vittae separating the face and cheeks.

Type, ♂, allotype, ♀, and ♂ ♀ paratypes, San José, Costa Rica, September, 1905 (P. Biolley). The specimens were received from Mr. Hall and the two types will be deposited in the United States National Museum.

This is evidently the species referred to *V. lugens* Wiedemann by Williston in the Biol. Cent. Amer., Dipt., iii. The smaller size, very obscure facial vitta, less abundant pile, facial profile, etc., distinguish it. It traces to *lugens* in my key.

A REVISION OF FOSSIL GYRINIDAE.

By Melville H. Hatch,[1] Minneapolis, Minn.

The fact that fossil Coleoptera are two dimensional objects adequately recorded in the form of figures makes it possible to study them from that source. It seemed worth while, accordingly, to assemble as much as possible of the widely scattered literature on fossil Gyrinidae and to attempt a critical estimate of the same.

Family Palaeogyrinidae Schlechtendal.

Palaeogyrinus strigatus Schlechtendal (figs. 1 and 2).—The family Palaeogyrinidae was established in 1894 by Schlechtendal for a remarkable fossil from the Upper Oligocene of Rott in Siebengebirge near Bonn, Prussia. It was suppressed as a true gyrinid by Handlirsch. This action involves such a radical change in the conception of the Gyrinidae that it is better to assign this fossil to an independent family more or less intermediate between Dytiscidae and Gyrinidae. Possibly it can be considered a subfamily of Dytiscidae, but not a gyrinid. The three families may be distinguished as follows:

- A^1. Eyes undivided so that from above the eye intersects the margin of the head; mesosternum transverse; mesopods not greatly flattened; sides of head not emarginate.
  - B^1. Mesosternum small; mesopods prehensile, not greatly flattened; elytra usually not definitely striate; body not narrowed behind; Mesozoic to Recent. Dytiscidae.
  - B^2. Mesosternum larger; mesopods moderately flattened, apparently for swimming; elytra nine-striated; body strongly narrowed behind; Upper Oligocene of Europe .... *Palaeogyrinidae.
- A^2. Eyes divided so that from above the dorsal eye does not intersect the margin of the head; mesosternum elongate, diamond shaped; mesopods greatly flattened for swimming; sides of head emarginate anterior to eyes; elytra nine, eleven, or unstriated; body not strongly narrowed behind; Lower Lias to Recent .... Gyrinidae.

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[1] A contribution from the Department of Animal Biology of the University of Minnesota.

The eyes of *Palaeogyrinus* are probably entire. The emargination that appears on the side of the head in the fossil is undoubtedly an artifact due to the loss of the greater portion of the compound eye in the process of fossilization. The general form of the body suggests the stream lines of other aquatic Coleoptera, though the pronounced caudal narrowing is a feature that I can duplicate in no living species. I suspect the animal to have been a bottom rather than a surface dweller.

Family GYRINIDAE.

Tribe *Enhydrini.*

Four fossils (figs. 3–6) from the Upper Miocene of Oeningen, Baden, were described by Heer as two species of *Dineutus* (*longiventris,* figs. 3 and 4; *insignis,* figs. 5 and 6), despite the gapping of the elytra at the base of three of them, which he attributed to a spreading in the course of preservation. Ochs (1926) denies that these are *Dineutus* at all, and assigns them to an extinct branch of the Gyrinini. Their large size and absence of discal striae precludes this, and I propose to regard the specimen without a " scutellum " as a true *Dineutus,* subgenus *Cyclinus,* and to erect for the others a provisional genus **Miodineutes** nov., as the type of which I cite **Miodineutes oeningenensis** sp. nov. (fig. 6). Its relation to the other genera of Enhydrinae is illustrated by the following table based upon characters available in fossils:

A¹. Scutellum visible.
  B¹. Broadly oval; elytra striated; western South Amrica. *Enhydrus* Cast.
  B². Less broadly oval; elytra feebly truncate at apex; elytral striae except a marginal line obsolete; Upper Miocene of Europe .... ***Miodineutus** gen. nov.
  B³. More elongate; elytra more distinctly truncate at apex; eltyral striae usually present but faint.
    C¹. External elytral angle not prominent; Andean. *Andogyrus* Ochs.
    C². External elytral angle prominent; Australasian. *Macrogyrus* Rég.
A². Scutellum invisible.
Dineutus MacL. (*Porrhorrhynchus* Cast.).

Key to species of *Miodineutes* nov.

A¹. Scutellum large; narrowed from humeri; tip of abdomen short; 11.2 mm. long (9.3 mm. to tip of elytra).
oeningenensis sp. nov. (fig. 6).

A². Scutellum small.
  B¹. Narrowed from humeri; tip of abdomen short; 11.2 mm. long (9.3 mm. to tip of elytra).
  insignis (Heer) (fig. 5).
  B². Narrowed from behind humeri; tip of abdomen elongated; 11.3 mm. long (8.1 mm. to tip of elytra).
  heeri sp. nov. (fig. 3).

The genus *Miodineutes* is provisional to the extent that the interpretation to be placed on the " scutellum " is in doubt. In general the form approaches that of *Cyclinus,* and its relationships are apparently with that group and *Andogyrus.*

Dineutus (*Cyclinus*) *longiventris* Heer (fig. 4) (*Dineutes longiventris* Heer).

Upper Miocene of Oeningen, Baden. Length 11.3 mm. (8.1 mm. to tip of elytra), width 5 mm. Body narrow; scutellum absent; elytra without sculpture except for a marginal line, broadest behind humeri, which are broadly rounded; elytra broadly rounded behind, apices obliquely truncate, with external angles obtuse, sutural angles dehiscent and acute; terminal segments of abdomen narrowed, elongate; apex of pronotum not sinuate, thus differing from the recent species.

The size and absence of a scutellum place this species in the genus *Dineutus,* and the small size for the genus, narrower contour, and rounded or feebly prominent apical angles seem to ally it with the North American subgenus *Cyclinus.* The 9° Cent. greater temperature which Heer says must be postulated to account for the biota of the central European Upper Miocene may likewise have rendered possible for *Cyclinus* intercommunication between Europe and North America via the North Atlantic land bridge. This land bridge had long been in existence and at this period was only beginning to flounder. If this species is a true *Cyclinus* it is almost surely a migrant from North America, and may indicate that previous to the Pleistocene glaciation Europe was included in the range of this subgenus. As compared with the living species, it somewhat resembles *hornii* Rbts., one of the more derivative species of the group.

Tribe GYRININI.

Key to Genera of *Gyrinini.*

A¹. Elytra not striate; Lower Lias to Upper Miocene of Europe. **Gyrinoides* Motschulsky.

A². Elytra eleven-striate, discal striae rarely obsolete.

- B¹. Striae extending independently nearly to apex, present as rows of punctures; Interglacial of Europe and North America (type, *Gyrinus confinis* Scudder nec Lec.). ***Protogyrininus** gen. nov.
- B². Certain of the striae coalescing well before apex.
  - C¹. Striae present as furrows.
    - D¹. Dorsal eye scarcely anterior to ventral eye; dorsum with or without yellow margin; Recent in old world .... *Aulonogyrus* Rég.
    - D². Dorsal eye anterior to ventral eye; dorsum with yellow margin; Recent: India, Indo-China, China .... *Paragyrinus* Ochs.
  - C². Striae present as rows of punctures; dorsal eye anterior to ventral eye; dorsum without yellow margin; Lower Pleistocene to Recent; cosmopolitan except central Africa .... *Gyrinus* Geoffr.

Under *Gyrinoides* I have placed two fossils that apparently belong to the Gyrinini and agree in the absence of elytral striae.

Key to species of *Gyrinoides* Motschulsky.

A¹. Dorsum probably without yellow margin; elytra with marginal line; length 3.5 mm.; Lower Lias of Europe. *G. atavus* (Heer).

A². Dorsum with yellow margin; length 2.26 mm.; Lower Oligocene of Europe .... *G. limbatus* Motschulsky.

Gyrinoides atavus (Heer) (fig. 7) (*Gyrinus atavus* Heer, *Anagyrinus atavus* (Heer) Handlirsch).

Lower Lias of Schambelen in Aargau, Switzerland. Length 3.5 mm. Broad, oval, gradually narrowed behind; scutellum present, small; elytra without sculpture except for a marginal line; apices of elytra truncate.

The body is too broad and the size too small to admit this form to any of the other tribes. This is the only one of the Mesozoic fossils traditionally ascribed to Gyrinidae that there is any reason to retain in the family. The others all either have the eyes in dorsal view intersecting the sides of the head or are known from elytra alone, and must be left for the audacious coleopterist who will attempt a revision of the Mesozoic beetles.

Gyrinoides limbatus Motschulsky. Baltic Amber, Upper Oligocene of Europe. Length 2.25 mm. "*Gyrinoides limbatus* M., voisin de notre *Gyrinus minutus,* mais plus applati, élytres sans stries et bordées de jaune. Long. 1 lign." In these words Motschulsky describes a species of Coleoptera in the Menge collection from the Baltic Amber. Though the presence of a scutellum is not noted, I place it tentatively in the Gyrinini. It is the smallest gyrinid known.

Protogyrininus confinis (Scudder) (figs. 8 and 9) (*Gyrinus confinis* Scudder nec Lec., *Gyrinus sculpturatus* Mjöb.).—Interglacial of Sweden and Fourth Interglacial of Scarborough, Ontario. Known from two elytra which are 5 mm. in length, eleven-striate with the striae continuous independently nearly to the apex. The color of the Swedish specimen is black with black hypomera and bronzed outer and basal margins. The Swedish specimen possesses a micro-reticulation in which the meshes are slightly longitudinal towards the scutellum and strongly transverse towards the outer margin. I find no distinctions capable of definition between the figures of the North American and European specimens.

The eleven-striated condition of the elytra is of such uncommon occurrence that, accompanied by a similarity of contour, there is no doubt about assigning this species to the Gyrinini. The arrangement of the striae, if it is correctly illustrated in the figures, is more primitive than in the recent genera, approaching that of the nine-striated *Enhydrus.* More weight should be given to the arrangement of striae than to whether they are impressed furrows or consist of rows of punctures. So that *Gyrinus* and *Aulonogyrus* are more closely interrelated than is either to *Protogyrininus.*

Gyrinus.

I cannot find that Lomnicki's two Lower Pleistocene species differ in definable respects from the two recent species with which he compares them.

Gyrinus marinus Gyll. Algeria, Europe, Siberia.

G. praemarinus Lomnicki (fig. 10): Lower Pleistocene of Boryslaw, Galicia. Microsculpture of elytra reticulato-punctate; marginal hollow of elytra narrow.

?*G. marinus* Gyll. Heer: Interglacial of St. Jakob, Basel, Switzerland.

Gyrinus praeopacus Lomnicki, 1894: Silesia, northern Europe; Lower Pleistocene of Boryslaw, Galicia. Microsculpture of elytra reticulato-punctate; marginal hollow of elytra broad (fig. 11).

G. thomsoni Zaitz., 1907. If my interpretation of *praeopacus* as a living species is correct, it is synonymous with the *G. thomsoni* Zaitz. of Munster's table (Saert. Nors. Ent. Tids. 2, p. 37) and Lomnicki's name must take precedence.

I place an interrogation point before Heer's record of *G. marinus* from the interglacial because it is not accompanied by a figure. Furthermore, the elytron that Heer figures in the same work and assigns to *G. natator* is evidently not a *Gyrinus* and probably not a gyrinid because only ten striae are present and the apex is not only truncate but even feebly emarginate, whereas in *Gyrinus* the truncature is somewhat convex.

The foregoing paper is based entirely upon published figures and descriptions and these have been interpreted rather literally. I can only express the hope that, if it falls into the hands of the curators of the type material, they will check my conclusions and figures with the types and make known discrepancies that may be detected.

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Tribe Enhydrini. Ochs, *ibid.*

Miodineutes oeningenensis n. sp.

Dineutes insignis Osw. Heer, 1862, Beiträge zur Insektenfauna Oeningens, Coleoptera. Natur. Verhand. Holl. Maat. Weten. Haarlem 16: 43–44, Aaf. II, fig. 28 (incorrectly labeled *D. longiventris*); Scudder, 1885, *ibid.*, fig. 1066 (incorrectly labeled *D. longiventris*); Ochs, *ibid.*

Miodineutes insignis (Heer).

Dineutes insignis Heer, 1862, *ibid.*, pp. 43–44, Taf. II, fig. 27; Ochs, *ibid.*

Miodineutes heeri n. sp.

Dineutes longiventris Heer, 1862, *ibid.*, p. 44, Taf. II, fig. 25; Ochs, *ibid.*

Dineutus (*Cyclinus*) *longiventris* Heer.

Dineutes longiventris Heer, 1862, *ibid.*, p. 44, Taf. II, fig. 26 (incorrectly labeled *D. insignis*); Heer, 1876, The Primaeval World of Switzreland (translated by Haywood) (1865, Die Urwelt der Schweiz, Zurich), Vol. II, fig. 281; 1883, Die Urwelt der Schweiz, 2nd ed., fig. 323; Hatch, *ibid.*; Ochs, *ibid.*

Tribe Gyrinini.

Gyrinoides atavus (Heer).

Gyrinus atavus Heer, 1876, *ibid.*, Vol. I, pl. VIII, fig. 18; 1883, *ibid.*, pl. VIII, fig. 18.

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Incertae sedis.

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Orectochilus, Handlirsch, 1921, *ibid.,* p. 227, Baltic Amber (listed only).

Not Gyrinidae.

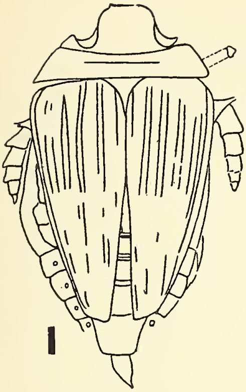
Gyrinus natator Heer nec. L., 1883, *ibid.,* p. 581, Taf. XII, fig. 17 (only 10 striae on elytron).

The Mesozoic forms rejected as Gyrinidae by Handlirsch are not listed.

Explanation of Plate VII.

Fig. 1–2: *Palaeogyrinus strigatus* Schlechtendal (1894, pl. 12, figs. 1–2); fig. 3: **Miodineutes heeri** n. sp. (Heer, 1862, pl. II, fig. 25); fig. 4: *Dineutus* (*Cyclinus*) *longiventris* Heer (*ibid.,* fig. 26); fig. 5: *Miodineutes insignis* Heer (*ibid.,* fig. 27); fig. 6: **Miodineutes oeningenensis** n. sp. (Heer, *ibid.,* fig. 28); fig. 7: *Gyrinoides atavus* (Heer) (1876, Vol. I, pl. VIII, fig. 18); fig. 8: *Protogyrininus confinis* (Scudder) (1900, pl. X, fig. 5); fig. 9: *Protogyrininus confinis* (Scudder) (Mjöberg, 1905, fig. 1); fig. 10: *Gyrinus marinus* Gyll. (Lomnicki, 1894, pl. V, fig. 46); fig. 11: *Gyrinus praeopacus* Lomnicki (*ibid.,* fig. 47).

Trichocorixa and not Corixa for the Genus of Corixidae Found in America.—The small American Corixids which have the strigil on the left side of the abdomen in the male are not congeneric with the old world insects of the genus *Corixa.* They must, therefore, be referred to the genus *Trichocorixa* established by Kirkaldy for *Corixa pygmaea* Fieb. in Canadian Entomologist, Vol. XL, p. 118, 1908. The name is an unfortunate one, but nevertheless must be applied.—H. B. Hungerford, Department of Entomology, University of Kansas, Lawrence.



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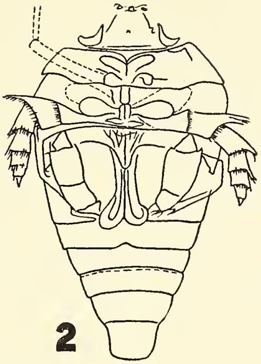

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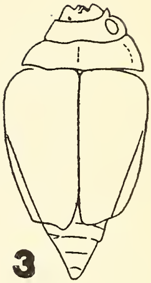

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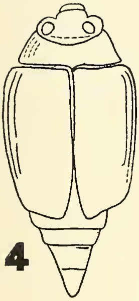

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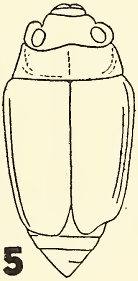

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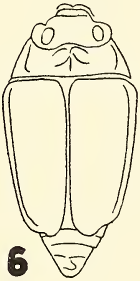

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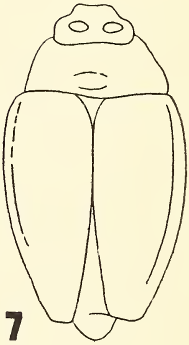

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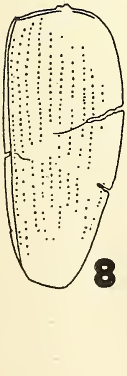

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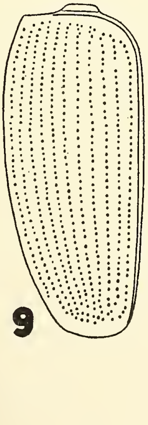

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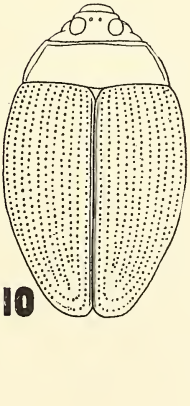

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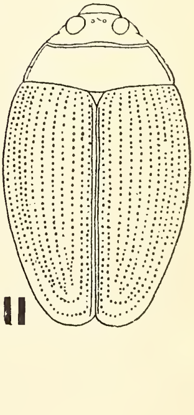


11

ON THE MIRIDAE IN BLATCHLEY'S "HETEROPTERA OF EASTERN NORTH AMERICA."

By Harry H. Knight, Ames, Iowa.

Recently there has appeared a general treatise on Hemiptera by W. S. Blatchley, entitled " Heteroptera or True Bugs of Eastern North America," bearing the publication date of October 18, 1926. This book exhibits unusual ability in the compilation of the subject-matter, chiefly from the " Hemiptera of Connecticut," but the author has also mixed in much new material. In so doing he has fallen into several errors. The purpose of this paper is to make such corrections for the family Miridae as are apparent at the present time.

The sequence of genera and species follows the Van Duzee Catalogue for the most part, beginning with the higher forms and working back to the lower, a sequence not found in Blatchley's books on Coleoptera and Orthoptera. The book treats of 467 species of Miridae as occurring east of the Mississippi River, but of this number twelve species listed either do not occur in the territory assigned, or will be shown (here and elsewhere) to refer to species misidentified, while three of Blatchley's new or recent species are shown to be synonyms. Discussion of particular species will be taken up under the page and name used by Blatchley.

(p. 673) *Eioneus gutticornis* sp. nov.

The genus *Eioneus* Dist. has been shown by Poppius (1912) to be a synonym of *Dolichomiris* Reut. (1882). Furthermore, the description of *gutticornis* Blatch. fits *D. linearis* Reut. in all essential characters, indicating an extension of that species from Venezuela and Central America to the coast of Florida. *Dolichomiris linearis* Reut. is a maritime species of wide distribution as pointed out by Reuter (1902).

(p. 679) *Mimoceps* Uhler.

The writer has published details elsewhere (Can. Ent., LIX: p. 20, 1927), indicating that *Mimoceps gracilis* Uhl, is only a variety of *insignis* Uhl. In this species the form of the pronotum varies according to the wing development of the individual. In a large series of specimens collected at Armonk and White Plains, New York, by Mr. Torre-Bueno, all variations in form of the thorax exist, the longer winged individuals having pronotum broad at base (*insignis*), while the short-winged specimens have the base of pronotum narrower (*gracilis*). As a color variety *gracilis* Uhl. may be distinguished as the form with pale hemelytra and transverse black band across middle; while typical *insignis* Uhl. has black hemelytra with pale spot only at base of each wing.

(p. 683) *Platytylellus confraternus* (Uhler).

The writer has pointed out elsewhere (Can. Ent., lviii, 1926, p. 255) that typical *confraternus* Uhl. has not been collected from the Eastern states. The form that I have described as var. *collaris* and upon which Blatchley bases his record for *confraternus* will very likely prove to be of more than varietal significance. Aside from color differences, variety *collaris* has the pronotal disk distinctly more convex than *confraternus* Uhl., while the collar is more flattened above and wider.

In his key to the species of *Platytylellus,* Blatchley runs *confraternus* in the section " Basal joint of antennae not as long as width of vertex." Both the typical *confraternus* Uhl. (♀, segment I, .92 mm., vertex .86 mm.) from Colorado, and the form *collaris* (♀, segment I, .89 mm., vertex .86 mm.) have segment I slightly exceeding width of vertex, thus the student will have difficulty in tracing either of these forms to *confraternus* in the key.

(p. 695) *Paracalocoris incisus* (Walker).

Capsus incisus Walker turns out to be a color variety of *Paracalocoris externus* (H. S.) as Mr. W. E. China, of the British Museum, has informed me, and as the writer has published in a paper giving keys to the eighteen known *Nearctic* species (Ann. Ent. Soc. Am., xix, 1926, pp. 367–377). The writer had previously shown (Ent. News, xxxvii, 1926, p. 261) that *Paracalocoris novellus* Blatch. is a color variety of *Paracalocoris externus* (H. S.), and strangely enough *novellus* now turns out to be identical with variety *incisus* Walker. The writer entrusted Blatchley with certain Ms. names which he used in a way which would validate them, and in one case at least he has validated one erroneously, for the name *verus,* which I had to discard when Blatchley described his *novellus,* now becomes another synonym of variety *incisus* Walker. The writer's paper on *Paracalocoris externus* (H. S.) came out in the October number of Entomological News, just a day or two ahead of Blatchley's book, thus my varietal names for *externus* H. S. are validated there, but not the *verus* of Blatchley.

Among the material Blatchley sent me for determination was a specimen of *Paracalocoris externus incisus* (Walker), which he had labeled "*Platytylellus* sp." on a blue slip (the blue tag meaning unique in his collection, as I was informed). I wrote him that this particular specimen was a species of *Paracalocoris* upon which I was publishing. Nothing more was said about it until Blatchley came out with a paper in Entomological News (June, 1926), describing this particular insect as *Paracalocoris novellus,* based on other material remaining in his possession. And yet Blatchley complains about the kind of cooperation received at the hands of unnamed students of Hemiptera, after treating more than one of us thus.

(p. 713) *Phytocoris megalopsis* sp. nov.

Blatchley has here redescribed *Phytocoris angustifrons* Kngt., while at the same time he has placed *angustifrons* Kngt. in group IV of the genus, where the key calls for species having the length of first antennal greater than width of head. I am at a loss to account for this mistake, since Blatchley had the holotype of *angustifrons* for study when drawing up his description of the species. The student is referred to my original description of *angustifrons* (Bull. Brook. Ent. Soc., xxi, 1926, p. 164) where accurate micrometer measurements are given for the antennal segments; the short first antennal segment placing the species unmistakably in group II of Blatchley. In this species the first antennal segment is so short one would not even require the use of a micrometer to see that segment I is equal to little more than half the width of head. This suggests the importance to all workers of making use of the eye-piece micrometer to obtain measurements of head and antennae for descriptions.

(p. 717) *Phytocoris annulicornis* Reuter.

Blatchley quotes the writer as considering *bipunctatus* V. D. a synonym of *annulicornis* Reut. It would have been more accurate to state the facts as I wrote them; namely: that I received a co-type of *annulicornis* Reut. through the good offices of Dr. Bergroth. This co-type is the same as *bipunctatus* Van D., a species I have also collected in Texas. However, this does not settle the matter since the co-type series may contain two species, and indicates the necessity of examining the type or remaining co-types. The co-type at hand has the wings partly spread and somewhat wrinkled, and had it been used for the type, the two pale spots could easily have been overlooked by Reuter in 1875.

(p. 718) *Phytocoris albitylus* Knight Ms.

This species was described (Bull. Brook. Ent. Soc., xxi, 1926, p. 162) in a paper which appeared about two weeks before Blatchley's book.

(p. 727) *Phytocoris angustifrons* Knight Ms.

This species was also described in the paper mentioned above (Bull. Brook. Ent. Soc., xxi, 1926, p. 164). It is the same species as that described by Blatchley (p. 713) under the name *Phytocoris megalopsis.* Blatchley described antennal segment I as " one-fifth longer than width of head across eyes," while my description will show segment I, length .66 mm., width of head 1.13 mm. Since Blatchley had the labeled type for study I can offer no explanation for this mistake.

(p. 730) *Phytocoris rubellus* Knight Ms.

This species was also described in the paper (Bull. Brook. Ent. Soc., xxi, 1926, p. 166) mentioned above, wherein seven species are described that are not included in Blatchley's book.

(p. 733) *Creontiades filicornis* (Walker).

Mr. W. E. China writes me that the type *filicornis* Walk. runs in my keys (Hemiptera of Connecticut) to *Eustictus grossus* Uhler. Since this species is such a distinct form there could scarcely be any mistake in placing it in the keys. It is regrettable that Uhler's distinctive name should pass into synonymy but the evidence seems rather conclusive.

(p. 736) *Polymerus cuneatus* (Distant).

Under this species Blatchley places his *clandestinus* as a synonym. However, I place *clandestinus* Blatch. more exactly as a synonym of *flavocuneatus* Reut., a form which may possibly be the same species as *cuneatus* (Dist.). More collecting and study of *cuneatus* is needed to understand its relation to certain closely allied forms.

(p. 797) *Labops hesperius* Uhler.

Under this name Blatchley has placed *hirtus* Kngt. as a synonym, apparently being led into this error when he chanced to learn that *hirtus* had been found in Colorado with black tibiae (to which I can now add specimens from Colorado and New Mexico); also that the simple pubescence of this species was found to vary somewhat in length. It is curious to note how in this case Blatchley has relied on color characters to sway his opinion more than the structure of the juga and figures of male genitalia which I published with a key to the species (Can. Ent., liv, 1922, p. 260). It becomes apparent that Blatchley has never seen a specimen of *hesperius* Uhl., although the type is preserved in the U. S. National Museum, where I studied it first in 1915 and again in 1926, yet he did not find it necessary to make a trip to Washington to study the types preserved there. How anyone could write an original work on the Hemiptera of North America without studying the Uhler types is quite beyond the average scientific worker.

Just as an experiment to see how easy it is to distinguish *hirtus* Kngt. from *hesperius* Uhler, I placed specimens of both species before a student of entomology who had never before seen members of this genus, and asked him to point out any differences. The student spent ten minutes with the binocular, whereupon he reported differences in pubescence, genitalia, shape of the head, and relative lengths of antennal segments as compared with width of head. The shape of the head exhibits marked differences in these species. In *hesperius* Uhler the juga of the male are strongly inflated, obscuring the basal half of tylus as viewed from the lateral aspect; also the sides of the frons have a sharp depression beginning above base of antenna and extending along inner margin of eye and joining with the depression along base of vertex. Both sexes of *hesperius* exhibit the depressed vertex and sides of frons, although it is more strongly marked in the male. In *hirtus* Kngt. the juga are not inflated, thus the tylus is not at all obscured when viewed from the lateral aspect; the vertex and sides of frons evenly convex.

Another peculiar discrepancy in Blatchley's treatment of *Labops* is found in his key for two species, wherein he separates *hesperius* Uhler by " Cheeks of male strongly convex, concealing base of tylus when viewed from the side." These characters were apparently taken from my key (1922) but without having looked at a male of *hirtus* to see if it would really run there. The key is correct as it stand for separating *hesperius* Uhler, but I invite the student to try a specimen of *Labops* collected in Ontario, New York, or eastward, and see if the male has inflated juga which obscure the base of tylus when viewed from the side.

(p. 808) *Pilophorus brimleyi* Blatchley.

When passing through Raleigh, N. C., during the past summer (1926), I called upon Mr. C. S. Brimley, who very kindly showed me the insect collections in the State Department of Agriculture. I was greatly surprised to discover that the type of *Pilophorus brimleyi* Blatchley is nothing more nor less than *Barberiella apicalis* Kngt. Blatchley has here described as a *Pilophorus* a species which belongs in the subfamily Capsinae. Had a little more use been made of the keys he has used in his book, such a mistake should have been avoided. The resemblance of *Barberiella* to *Pilophorus* is superficial only; besides the subfamily characters, the "whitish cross-bar on the corium" is a translucent mark, while the bands in *Pilophorus* are produced by silvery scales only. Mistakes of this sort shake the confidence of the student to the point where we can have only doubts about Blatchley's treatment of new forms, or until the types have been examined by other workers.

(p. 811) *Pilophorus cinnamopterus* (Kirschbaum).

All determinations I have seen for this species from North America are misidentifications. After having examined nearly all the Mirid collections in the United States, I feel justified in excluding *cinnamopterus* Kirsch. from our list until someone comes forward with specimens collected in North America. European specimens are at hand for comparison if anyone believes he has the species.

(p. 811) *Pilophorus amoenus* Uhler.

Blatchley has here continued an error found in the publication by Drake (1923), in that fig. 179 does not represent *amoenus* Uhler but the later described *Pilophorus strobicola* Kngt. *Pilophorus amoenus* Uhler is known to breed only on *Pinus virginiana,* where it is the most numerous of the several species of Miridae breeding on that tree. *P. amoenus* Uhler is known only from the areas where *Pinus virginiana* grows, and its distribution seems to be coextensive with the distribution of its host.

(p. 829) *Ceratocapsus rufistigmus* Knight Ms.

Blatchley takes the credit for this species since the description is written by him. He made no request for my description or indication of when he would publish the name.

(p. 835) Key to species of Lopidea.

This key indicates that *confluens* Say can be separated from *lathyri* Kngt. and *robiniae* Uhler by the first antennal segment being shorter than width of vertex. Micrometer measurements show that both sexes of *robiniae* and the female of *lathyri* have width of vertex greater than length of segment I, thus all three species will run in the key to *confluens* Say.

While a key using color characters may be an aid in naming typically colored females, the only positive method of determining species of *Lopidea* is to observe the male genital claspers and compare with specimens or published figures of those structures. The writer finds that the modern student of Hemiptera does not object to comparing the genital claspers, and is pleased with the positive and quick results obtained in that way.

(p. 846) *Globiceps dispar* (Boheman).

This species can scarcely be called an introduced form since its occurrence in Canada and several localities in the Rocky Mountain region indicate an original wide distribution in the Nearctic region.

(p. 909) *Dicyphus notatus* Parshley.

After studying type material of *D. vestitus* Uhler and *D. notatus* Parshley, I can say that they are identical. This can even be verified by the descriptions. The writer is largely to blame for Dr. Parshley making this mistake, since for a period before I studied this genus critically, I had passed along Heidemann's determination of *vestitus,* which for the eastern records was later found to refer to *discrepans* Kngt. *Dicyphus gracilentus* Parsh. is not the same as *vestitus* Uhler, as pointed out below.

(p. 910) *Dicyphus vestitus* Uhler.

Under this name Blatchley has placed *D. gracilentus* Parsh. as a synonym, but as a matter of fact *gracilentus* Parsh. is a good species, apparently limited in distribution to the Mississippi basin. For those who have not had opportunity of examining type material of *vestitus* Uhler I will point out a distinction in the original description: "antennae . . . second joint about as long as the pronotum." In *gracilentus* Parsh., length of segment II is equal to more than one and a half times length of pronotum.

(p. 915) *Teleorhinus floridanus* Knight Ms.

Blatchley takes the credit for this species since my description (Can. Ent., lviii, 1926, p. 254) did not appear until some days after Blatchley's book was out.

(p. 915) *Teleorhinus tephrosicola* Knight.

Blatchley gives the host plant for this species as goat's rue (*Cracca virginiana* L.), while the same plant bears the name of *Tephrosia virginiana* L. in Gray's "New Manual of Botany."

(p. 947) *Chlamydatus pulicarius* (Fallén).

Blatchley here records some of my material as "Rock Creek," N. Y., July 4. This should read "Rock City," a point near Four Mile, New York, but not on the map.

(p. 957) *Psallus variabilis* (Fallén).

This species was originally recorded in North America from Ontario and New York by Mr. Van Duzee. In the early Van

Duzee collection, and now a part of the Iowa State College collection, I find the specimens upon which the record was based, and they turn out to be *Lepidopsallus rubidus atricolor* Kngt. Apparently *variabilis* (Fallén) has not been taken in North America as yet.

(p. 960) *Cylloceps pellicia* Uhler.

An examination of the type now found in the U. S. National Museum collection shows this species to belong in the genus *Cyrtorhinus.* The species should now be listed as *Cyrtorhinus pellicius* (Uhler).

There are certain other features in the book that can scarcely be passed without notice. It is now a well-established courtesy, if not scientific principle, to give credit to the collector of material if data is available, especially if definite records of such are to be published. But Blatchley gives credit only to the person or collection from whom he happens to borrow the specimens. This feature is so conspicuous in the book that I have counted up in the family Miridae, where I find that the only records he had for sixty-three (63) species were based on material that the present writer had collected, named, and distributed, yet there is no indication of this in his account. On the other hand, he has even indicated the names of other people as collectors of this material. The majority of these species were represented by paratypes, but the student would not suspect it. The value of the book could have been increased had he indicated those species which were redescribed from type material rather than losing such data among other species of doubtful determination. Practically all the records from Ithaca, Batavia, and Portage, New York, are from material collected by the writer, yet Blatchley has credited them to others. All the Minnesota records cited are from material collected by Mr. A. A. Nichol or the writer.

TWO NEW MEMBRACIDAE (HOMOPTERA) FROM SUMATRA.

By W. D. Funkhouser, Lexington, Ky.

Through the courtesy of Mr. Edward Jacobson, of Fort de Kock, Sumatra, the writer has been permitted to examine a considerable number of specimens of Membracidae from Sumatra, among which have been found two new species which may be described as follows:

Emphusis bulbifer sp. nov. (Figs. 1, 2 and 3.)

Large, black, punctate, not pubescent, anterior pronotum expanded into a subspherical bulb; suprahumeral horns heavy, triangular, curving backward and downward; posterior process strong, tectiform, sharp, not quite reaching apices of tegmina; tegmina smoky hyaline, costal and apical areas reddish; undersurface, abdomen and legs black; tarsi dark brown.

Head broader than long, subrectangular, black, roughly sculptured, finely punctate, densely pubescent; base arcuate; eyes large, dark brown; ocelli large, conspicuous, amber-colored, farther from each other than from the eyes and situated well above a line drawn through centers of eyes; clypeus long, feebly trilobate, extending for two-thirds its length below inferior margins of genae, tip rounded and densely pilose.

Pronotum black, shining, coarsely punctate, not pubescent except at basal margins; humeral angles large, prominent, rounded, extending as far laterad of the eyes as width of eyes; metopidium higher than wide, narrowest at base, widest between horns, convex; anterior pronotum swollen to form a large subspherical bulb; suprahumeral horns large, triangular, sharp, continuing curve of anterior pronotum, curving backward and downward, about as long as half the distance between their bases, upper surface convex, under surface flat; median carina almost obsolete on metopidium but prominent on dorsum and posterior process; posterior process strong, heavy, tectiform, tricarinate, slightly sinuate, not impinging on tegmina, tip sharp and reaching well beyond tip of abdomen but not extending to apices of tegmina; scutellum narrowly exposed, wider than long; distinct tooth on pronotum behind eye.

Tegmina long, narrow, smoky-hyaline; base narrowly black, opaque and punctate; costal and apical margins clouded with reddish-brown; veins fuscous; five apical and two discoidal areas; apical limbus broad.

Sides of thorax, under-surface of body and abdomen black with dense silvery pubescence; legs black and pilose; tarsi brown.

Length from front of head to tips of tegmina 10 mm.; width between tips of suprahumeral horns 7.2 mm.

Type: Female.

Type locality: Lubuksikaping (Sumatra, West Coast); Alt. 450 M. Collector: E. Jacobson.

Described from a single specimen from Mr. Jacobson's collection, to be deposited in the British Museum.

Periaman rectidorsum sp. nov. (Figs. 4, 5 and 6.)

Large, black, punctate, pubescent; dorsum straight; suprahumeral horns straight, sharp, projecting outward and very slightly upward; posterior process straight, sharp, extending just beyond tip of abdomen but not reaching apices of tegmina; tegmina vinaceous, costal and costal-apical areas very dark brown; undersurface and abdomen black; legs dark brown.

Head twice as broad as long, black, finely punctate, sparingly pubescent, roughly sculptured, decurved; base sinuate; eyes large, prominent, brown; ocelli large, yellowish, conspicuous, twice as far from each other as from the eyes and situated above a line drawn through centers of eyes; clypeus twice as long as broad, projecting for more than half its length below inferior margins of genae, tip rounded and densely pilose.

Pronotum black, finely punctate, sparsely pubescent; metopidium about as broad as high, nearly straight above the head; humeral angles large, blunt; suprahumeral horns triangular, sharp, tricarinate, flattened dorso-ventrally, about as long as the distance between their bases, extending outward and slightly upward; median carina percurrent; posterior process strong, nearly straight, tectiform, impinging on tegmina, tip acute, slightly decurved, extending slightly beyond tip of abdomen but not reaching apices of tegmina; scutellum narrowly exposed.

Tegmina vinaceous, subhyaline; costal and apical areas clouded with dark brown; base narrowly black, opaque and punctate; veins prominent, black in costal area, otherwise brown, median veins spined; five apical and two discoidal cells.

Undersurface and abdomen black with scanty white pubescence; legs and tarsi dark brown; hind trochanters unharmed.

Length from front of head to tips of tegmina 7.7 mm.; width between tips of suprahumeral horns 4.8 mm.

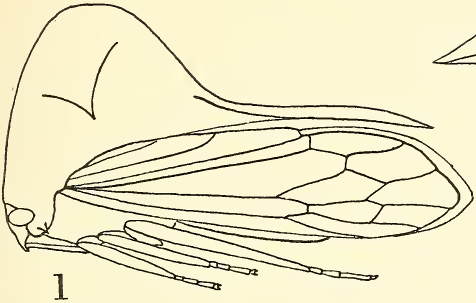
Type: Female.

Type locality: Anai Kloof (Sumatra, West Coast); Alt. 500 M. Collector: E. Jacobson.

Described from a single specimen from Mr. Jacobson's collection, to be deposited in the British Museum.

FIGURES.

1. *Emphusis bulbifer* sp. nov. (Lateral outline).
2. *Emphusis bulbifer* sp. nov. (Cephalic outline).
3. *Emphusis bulbifer* sp. nov. (Dorsal outline).
4. *Periaman rectidorsum* sp. nov. (Lateral outline).
5. *Periaman rectidorsum* sp. nov. (Cephalic outline).
6. *Periaman rectidorsum* sp. nov. (Dorsal outline).



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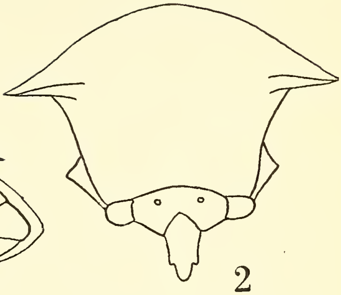

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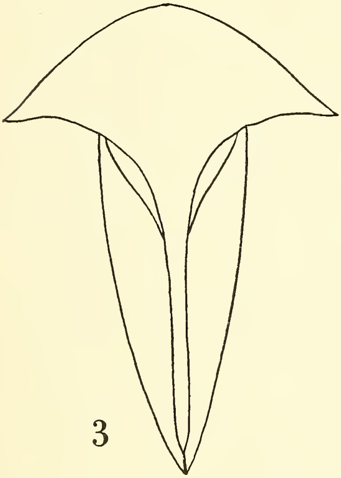

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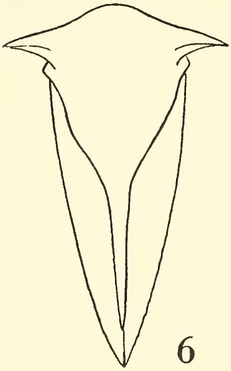

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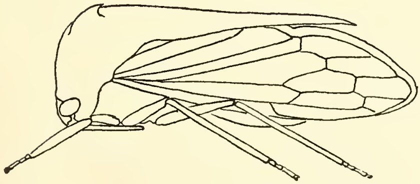

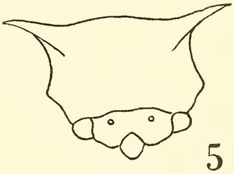

5

UNDESCRIBED SPECIES OF THE GENUS LIMNOPHILA FROM EASTERN NORTH AMERICA (TIPULIDAE, DIPTERA).

Part III.

By Charles P. Alexander, Amherst, Mass.[1]

In the present article additional species of the subgenus *Phylidorea* are discussed. The majority of the species were collected in New York State by Mr. Howard Notman and the writer. Others were included in the very rich collections of Professor Rogers. My sincere thanks are extended to Mr. Notman and Professor Rogers for the privilege of examining this material. Except where stated to the contrary, the types of the novelties are preserved in the writer's collection.

Limnophila (Phylidorea) neadusta n. sp.

Male.—Length about 8.5 mm.; wing, 9 mm.

Most closely related to *L.* (*P.*) *adusta* O. S., from which it differs conspicuously in the structure of the male hypopygium.

Pronotum and mesonotum much darker colored, deep brown medially, a little paler laterally, the median area sparsely pruinose. Legs with the femora yellow, the tips rather broadly infuscated; tibiae obscure yellow, the tips narrowly darkened; basal tarsal segments obscure yellow, their tips narrowly darkened; terminal tarsal segments uniformly dark brown. Wings with a yellowish tinge, the costal region clearer yellow; stigma brown; wing apex and a broad seam along vein *Cu* infumed; a very narrow brown seam along the cord. Venation: Cell R_2 strongly narrowed at proximal end, vein R_2 being strongly sinuous. Abdomen obscure yellow, with a dark brown subterminal ring, including segments eight and nine, together with a caudal triangle on tergite seven. Male hypopygium with the very elongate aedeagus and subtending gonapophyses of *L. adusta.* Ninth tergite having the caudal margin with a broad V-shaped notch, the large lateral lobes having the lateral angles obtuse. Simple gonapophyses much stouter than in *adusta,* each appearing as a powerful, heavily blackened rod, with a short lateral spine at near two-thirds the length. Apical portion of outer dististyle a long narrow point. Apical portion of inner dististyle longer and more slender than in *adusta.*

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[1] Contribution from the Department of Entomology, Massachusetts Agricultural College.

Habitat: New York.

Holotype: ♂, Keene Valley, Essex Co., July 14, 1920 (H. Notman).

Limnophila (Phylidorea) caudifera n. sp.

Male.—Length about 8.5–9.5 mm.; wing, 9–10 mm.

Generally similar to *L.* (*P.*) *adusta* O. S., differing notably in the structure of the male hypopygium.

General coloration of the mesonotum shiny brown. Legs with the femora bright yellow basally, passing through brownish yellow into brown, the tips dark brown; tibiae brown, the tips passing into brownish black; tarsi brownish black. Wings with a faint yellowish tinge, the base and cell *Sc* yellowish; cell *C* infuscated, brighter at both ends; stigma oval, dark brown; wing-apex narrowly seamed with dark brown; a conspicuous brown seam along vein Cu_1; narrower and less conspicuous brown seams along the cord and outer end of cell *1st* M_2; veins dark brown, the basal half of *M* more yellowish. Venation: *r* beyond midlength of R_2, cell R_2 pointed at proximal end; cell M_1 about as long as its petiole. Abdomen obscure brownish yellow, with a brown subterminal ring in the male. Male hypopygium with the median area of the caudal margin of the tergite produced caudad into a slender, tail-like lobe. Basistyle with the dorsal lobe provided with long yellow setae. Outer dististyle very broad and flattened, especially basally, the tip suddenly narrowed into a slender finger-like point. Inner dististyle very small and slender, gently curved, the apex a little expanded. Simple gonapophyses slender, nearly straight, heavily blackened. Aedeagus having the subtending apophyses fused basally with it for approximately the basal third.

Habitat: New York.

Holotype: ♂, Lake Pleasant, Hamilton Co., altitude 1,750 feet, June 17, 1926 (Alexander). *Paratopotype:* ♂, June 21, 1926.

Limnophila (Phylidorea) subsimilis n. sp.

Male.—Length about 9 mm.; wing, 9.5 mm.

In general coloration resembling *L.* (*P.*) *adusta* O. S., but in genitalic characters more closely related to *L.* (*P.*) *similis* Alex., which appears to be the nearest described ally.

Antennae with the flagellum obscure yellow, the outer segments passing into brownish yellow. Head gray. Mesonotum and pleura light fulvous, the postnotum and pteropleurite a trifle pruinose. Halteres with the knobs slightly darkened. Legs with the coxae concolorous with the pleura; femora black, the basal fourth or less abruptly light yellow, the amount of the latter color a very little greater on the middle and hind legs; shortly before the femoral tips a broad brighter brown ring, diffuse and very ill-defined; tibiae and tarsi brownish black. Wings very much as in *similis*; cells *C* and *Sc* strongly darkened; stigma oval, still darker brown; wing-tip narrowly but conspicuously darkened; a narrow brown seam along the cord, still more restricted on the outer end of cell *1st* M_2; veins brown, darker in the clouded areas. Abdomen obscure yellow, segments eight and nine dark brown. Male hypopygium much as in *similis*, differing in the details of structure of the outer dististyle and aedeagus. Outer dististyle expanded apically, the terminal spine very small, the tip of the style before it broadly expanded. Inner dististyle with the base dilated, with a little more than the apical half narrowed. Aedeagus stouter than in *similis*, the subtending apophyses very weak and slender.

Habitat: Tennessee.

Holotype: ♂, Scott Co., May 29, 1922 (J. S. Rogers); No. 4. Type returned to Professor Rogers.

The combination of bright fulvous thoracic coloration, the extensively blackened legs, and the structure of the male hypopygium, serve to differentiate this species from the allied forms.

Limnophila (Phylidorea) iowensis n. sp.

Male.—Length, 9–10 mm.; wing, 9–9.5 mm.

Female.—Length, 9–10.5 mm.; wing, 9–10 mm.

Belongs to the *adusta* group; most closely allied to *L.* (*P.*) *auripennis* Alex., from which it differs especially in the pattern of the legs and wings, and the details of structure of the male hypopygium.

Pronotum dark medially, shiny yellow laterally. Mesonotum shiny ferruginous, paling to yellow on the sides. Legs with the femora yellow, the tips narrowly infuscated; tibiae brownish yellow, the tips very narrowly infuscated; tarsi gradually passing into brown. Wings with a yellowish tinge, the base and costal region clearer yellow, cell *C* tending to become slightly infumed except basally; stigma dark brown; wing-apex narrowly but distinctly infumed; very narrow brown seams along the cord and outer end of cell *1st* M_2; space between the branches of *Cu* infumed; other longitudinal veins very narrowly and vaguely seamed with brown; veins brown, more yellowish at the wing-base and in the costal region. Venation: *Rs* relatively long, angulated at origin; cell R_2 relatively wide at base, gently widened at apex. Abdomen obscure yellow, without a dark subterminal ring in the male. Male hypopygium with the ninth tergite having the caudal margin gently emarginate. Basistyle only moderately setiferous, without the dense dorsal brushes of some of the allied species. Outer dististyle relatively slender, blackened at tip, the apical spine small, the apex cephalad of the spine microscopically serrulate. Inner dististyle with the basal half straight, the outer half more slender, strongly arcuated. Branched gonapophyses with the two major arms unequal, heavily blackened apically, the tips acute, each apophysis at near midlength of the outer margin further produced into a pale spinous flange. Aedeagus small, straight, about equal in length and diameter to its subtending apophyses, shorter than the branched apophyses.

Habitat: Iowa.

Holotype: ♂, Grinnell, Poweshiek Co., June 2, 1920 (J. S. Rogers); No. 43. *Allotopotype:* ♀, June 7, 1920; No. 45. *Paratopotypes:* 16 ♂ ♀, May 31–June 7, 1920; Nos. 42, 43 and 45.

Type returned to Professor Rogers.

Limnophila (Phylidorea) luteola n. sp.

General coloration dark ferruginous; head light gray; antennal flagellum with the basal segments yellow; femora black, the bases broadly obscure yellow; wings strongly yellow, clearer at base and along the costal margin; stigma and wing-apex darkened; male hypopygium with the arms of the branched apophyses elongate, blackened, acutely pointed.

Male.—Length, 9 mm.; wing, 9 mm.

Female.—Length about 8.5–10 mm.; wing, 8.5–9.5 mm.

Rostrum black, the palpi dark brown. Antennae with the first segment black, the succeeding four or five segments light yellow, the remaining segments passing into dark brown; flagellar segments passing through oval to linear. Head light gray, clearer anteriorly, the sides of the posterior vertex with a dark spot.

Mesonotum dark ferruginous, sparsely pollinose. Pleura and postnotum reddish ferruginous, with a sparse pruinosity. Halteres pale, the knobs weakly infuscated. Legs with the coxae concolorous with the pleura; trochanters yellowish testaceous; femora black, the bases broadly obscure yellow; on the fore legs, the pale bases include a little more than the basal third, on the hind legs more extensive, including a little more than the basal half to two-thirds; tibiae dark brown, passing into black; tarsi black. Wings with a strong yellowish tinge, the base and costal margin clear luteous; stigma oval, brown, well-defined; wing-apex narrowly but conspicuously darkened; veins brown, yellowish in the luteous areas. Venation: Rs short, angulated to short-spurred at origin; r near midlength of R_2, veins R_2 and R_3 rather strongly divergent; cell M_1 shorter than its petiole; $m\text{-}cu$ at or beyond midlength of cell $1st\ M_2$.

Abdomen obscure brownish yellow, without a black subterminal ring in the male, only the eighth segment a little infuscated; hypopygium obscure yellow. Male hypopygium with the outer dististyle relatively short and broad, the apical spine conspicuous, straight; inner dististyle strongly arcuated. Branched gonapophyses longer than the aedeagus, the longest arm about as long as the stem, both arms blackened, acute at tips, the shorter outer arm more slender and acute. Aedeagus and its subtending apophyses slender, approximately equal in length, not heavily blackened.

Habitat: New York.

Holotype: ♂, Lake Pleasant, Hamilton Co., altitude 1,800 feet, June 21, 1926 (Alexander). *Allotopotype:* ♀, June 18, 1926. *Paratopotypes:* 2 ♂♂, 20 ♀♀, with the types.

L. (*P.*) *luteola* is allied to *L.* (*P.*) *consimilis* Dietz, differing in the coloration of the wings and details of structure of the male hypopygium.

The type-series was taken by Mrs. Alexander and the writer in an *Iris* swamp in the southern Adirondacks Mountains. A cold stream flows through an upland pasture, spreading out in the nearby hollows, which are partly filled with *Sphagnum*. The dominant floral element in the swamp is *Iris*, from which many of the crane-flies were swept. Others were found resting on the limbs of spruce and balsam along the margins of the swamp. Only three males of this handsome species were found after a detailed search. Associated crane-flies in this swamp were: *Geranomyia rostrata* (Say), *Helius flavipes* (Macq.), *Pseudolimnophila inornata* (O. S.), *Limnophila macrocera* (Say), *Tricyphona inconstans* (O. S.), *Erioptera vespertina* O. S., *E. septentrionis* O. S., *E. needhami* Alex., and *Bittacomorpha clavipes* (Fabr.).

Limnophila (Phylidorea) fumidicosta n. sp.

General coloration orange-ferruginous; basal segments of the antennal flagellum yellow; head light gray; femora dark brown, their bases yellow; wings tinged with yellow, the costal cell and wing-tip infumed; abdomen brown, with a darker subterminal ring; male hypopygium with the branched gonapophyses elongate, the branches long, acute, blackened.

Male.—Length about 7 mm.; wing, 7.8 mm.

Rostrum and palpi dark brown. Antennae with the basal segment dark brown, the succeeding four segments yellow, the remaining segments brown. Head clear light gray, the posterior portions darker gray.

Pronotum infuscated, brighter laterally. Mesonotum light orange-ferruginous, the surface sparsely pollinose, more heavily so behind. Pleura concolorous. Halteres pale, the knobs only weakly infuscated. Legs with the coxae and trochanters yellow; fore femora dark brown, the basal fourth light yellow; middle femora dark brown, the basal third or a little more yellow; posterior legs missing; tibiae light brown, the tips narrowly darkened; tarsi passing into dark brown. Wings tinged with yellow; stigma oval, brown; cell *C* beyond the basal fourth distinctly infumed, the color extending along the costal margin and including the wing-apex; cell *Sc* yellow; veins brown. Venation: Sc_2 at the tip of Sc_1, both beyond the level of the fork of *Rs*; cell R_2 deep, at margin about one-third wider than cell *2nd* R_1; cell M_1 small; cell *1st* M_2 elongate, *m-cu* before midlength.

Abdominal tergites brown, the eighth segment dark brown. Male hypopygium with the outer dististyle flattened, relatively broad, gradually narrowed outwardly, the tip blackened, bifid. Inner dististyle small, strongly curved, the base glabrous. Branched gonapophyses elongate, the tips long, acute, blackened, the lower arm elongate, but shorter than the upper arm; besides these branches there is a small lateral spur on outer margin near fork. Aedeagus and subtending apophyses relatively small and inconspicuous.

Habitat: New York.

Holotype: ♂, Bool's Backwater, Fall Creek, Ithaca, June 13, 1917 (*Alexander*).

L. (*P.*) *fumidicosta* is most closely allied to *L.* (*P.*) *consimilis* Dietz and *L.* (*P.*) *luteola* n. sp., differing from both in the details of coloration and structure of the male hypopygium.

TWO UNDESCRIBED TINGITIDS FROM MEXICO.

By Carl J. Drake, Ames, Iowa.

Gelchossa praestantis n. sp.

Elongate, widening posteriorly; elytra with long, oblique, slightly curved, pale brown fascia extending in a furrow from just behind the discoidal area to its apex. Head with five slender, not very long spines, the median distinctly longer than the others. Antennae long, slender, pale brown, the fourth segment mostly fuscous; segment I long, not quite five times the length of the second; segment II short; III very long, slender, a little more than three times the length of four; IV slightly longer than I, brownish at base. Bucculae broad, reticulate, closed in front. Rostral channel widening behind, the laminae broad, testaceous and reticulate; rostrum reaching a little beyond the intermediate coxae. Paranota greatly dilated, strongly reflexed, widely reticulated, somewhat shell-shaped, widest a little behind the middle, with four rows of cells at its widest part. Hood very large, strongly inflated, widely reticulated, the nervures and part of cells brown to fuscous, its length slightly greater than its width. Lateral carinae short, raised anteriorly, composed of three cells; median carina strongly raised, not very long, slightly less than half the length of the hood, composed of two rows of large cells at its highest part.

Elytra long, divergent, widening from base, rounded at the tip; discoidal area narrow, not reaching the middle of the elytra, impressed, with three rows of cells; subcostal area triseriate, the cells rather small; costal area broad, widely reticulated, with four rows of areolae at its widest part. Nervures testaceous, the areolae hyaline, somewhat iridescent. Body beneath brown, legs pale brown, the tips of tarsi a little darker. Discoidal area with a fuscous spot near the apex.

Length, 3.66 mm., width, 1.43 mm.

Allied to *G. vesiculosa* Champion, but differs from it in having a broader and more strongly inflated hood, narrower paranota, shorter median carina, and a shorter and less conspicuous fascia of the elytra.

Holotype, female, Montaña de Sumidero, North of Tuxtla Gutiérrez, State of Chiapas, Mexico, elevation 1,000 feet, in virgin forest, May 30, 1926, collected by Doctor Alf. Dampf, in Drake collection. *G. dampfi* and *G. praestantis* were taken in company with *G. furculata* Champion and *Corythucha spinosa* Dugès.

Gelchossa dampfii n. sp.

Allied to *G. setigera* (Champion), but distinguished from it by the absence of spines on the margins of the paranota, the much smaller hood, the much longer first segment of the antennae, and the longer spines on the head.

> Elongate, slender, widening posteriorly. Pale testaceous, the outer nervure of each elytron (except base) and most of the nervures of sutural area (including oblique fascia) fuscous. Legs very slender, pale brown. Antennae long, slender; segment I dark fuscous, long, five times the length of two; II short, dark brown; III very slender and long, more than twice as long as four, brown; IV long, black (except brown basal portion), one and a half times the length of one. Head black, with three very long slender, sharp, testaceous spines with black tips; antero-lateral spines atrophied. Paranota broad, strongly reflexed, widely reticulated, with three rows of areolae, pale testaceous. Hood pale testaceous, rather small, somewhat cone-shaped. Lateral carinae foliaceous, pale testaceous, uniseriate, constricted a little behind the middle, extending from the hood to the posterior margin of pronotum. Median carina strongly foliaceous, a little higher than hood, strongly arched immediately behind hood, mostly biseriate, pale testaceous.
>
> Elytra long, divergent, a little broader and more widening from base than in *G. setigera*; costal area widely reticulate, broad, with four rows of areolae at its widest part; subcostal area narrow, biseriate; discoidal area short, narrow, impressed, with three rows of cells. Margin of elytra finely serrate, the margins of paranota indistinctly serrate. Abdomen and thorax beneath black. Areolae of hood, paranota and elytra hyaline.
>
> Length, 3.46 mm.; width, 1.14 mm.

Holotype, male, and *allotype,* female, Montaña de Sumidero, North of Tuxtla Gutiérrez, State of Chiapas, Mexico, elevation 1,000 feet, in virgin forest, May 30, 1926, collected by Doctor Alf. Dampf, in Drake collection. Paratype (collected with type) in collection of Doctor Dampf. *G. dampfi* and *G. praestantis* were taken in company with *G. furculata* Champion and *Corythucha spinosa* Dugès.

NEW FORMS OF LEPIDOPTERA.

By Franklin Chermok, Pittsburgh, Pa.

Apatela impleta, var. **Krautwormi** nov.

This peculiar form has black primaries with the characteristic markings of the species appearing in a dull gray. The secondaries are a little darker than the typical form.

Underside same as typical form.

The thorax, legs above, and antennae black. The body is brown.

Described from 3 ♂s, 1 ♀, all taken in N. S. Pittsburgh, Pa. Holotype ♂. April 24, 1925; allotype ♀. April 24, 1925; paratopotypes ♂. May 22, 1924; ♂. August 1, 1923.

Named in honor of Mr. B. Krautwormi of Pittsburgh, Pa. Mr. Krautwormi has reared more moths and butterflies than any one I know of.

Heterocampa umbrata, ab. **nigra.**

This aberration is like the typical form on the upperside, except that the primaries are jet black, and the fringes only a trifle lighter. The secondaries are a shade darker than the typical form. The fringe is lighter than the rest of the wing, and much lighter than the fringes of the primaries.

Underside, somewhat darker than typical form.

Colias philodice from *plicaduta,* ab. **minor.**

This aberration expands only 1¼ inches. The spots of the band of primaries are but for two lacking. The two present are represented by only a few scales. The black band of the secondaries is almost lacking, the area being dusted by a few black scales.

Underside normal.

Holotype ♀. June 28, 1925. N. S. Pittsburgh, Pa.

Colias philodice form *plicaduta,* ab. **Ehrmanni.**

This aberration has no spots in the band. The band of the primaries is almost double the width of a normal specimen, and the discoidal spot is three times as large as that of a normal specimen. It is otherwise much like the typical form except that the band on secondaries is very wide.

Holotype ♀. August 3, 1921. N. S. Pittsburgh, Pa.

Named in honor of my friend, the late George Ehrmann.

Colias philodice from *plicaduta,* var. **alba.**

This variety resembles "plicaduta" in all respects, except that it is white instead of yellow.

Holotype ♀. July 30, 1924; 2 paratypes August 17, 1925; 1 paratype August 16, 1925. N. S. Pittsburgh, Pa.

Satyrodes canthus, ab. **Boweri.**

This aberration is like the typical form, except that the upper side of the primaries is void of maculation. The secondaries and entire underside same as typical form.

Holotype ♂. July 29, 1921. Port Hope, Ontario, Canada.

Named in honor of Mr. H. L. Bowers, the collector of this peculiar specimen.

Body above. Head to collar lappet inclusive a dull brownish olive green, changing to black at posterior end of thorax. Abdomen dark brownish gray to last two segments, which are jet black. Antennae dark brown, lighter toward tips.

Underside slightly darker than typical form.

Holotype ♀. August 9, 1924. N. S. Pittsburgh, Pa.

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THE MUSEUM of the Brooklyn Institute has a few uncolored sets of the Calverly, Weidenmeyer and Edwards plates of North American Sphingidae for exchange or for sale at $5 per set. Address, Librarian, Brooklyn Museum, Eastern Parkway, Brooklyn, N. Y.

LEPIDOPTERA from the Mountains of Kentucky. Papilios and other var. of this section collected. Paper spec. of *Xylophanes tersa* and *Catopsilia Eubule* on hand. Also Cocoons of the larger Saturnid moths. Ellis Chandlee, Barbourville, Ky.

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NEW ARRIVALS.—From Colombia, French Guiana, and Brazil. Brilliant tropical Lepidoptera for scientific and decorative purposes. H. S. Parish, 14 Briarcroft Road, Toronto, Ont., Canada.

CYNIPIDAE.—Galls and bred wasps wanted to determine or in exchange. Alfred C. Kinsey, Indiana University, Bloomington, Indiana.

WANTED.—Am studying the bionomics of the corn billbugs and desire the privilege of examining *Calendra* (*Sphenophorus*) from all parts of the world. A. F. Satterthwait, U. S. Entomological Laboratory, Webster Grove, Mo.

WANTED.—Pentatomidae, Cydnidae, and Scutelleridae from all parts of the United States for determination or exchange. Dayton Stoner, State University of Iowa, Iowa City, Iowa.

DIURNAL LEPIDOPTERA.—Have many desirable western species to exchange, including *Argynnis atossa, macaria, mormonia, malcolmi, nokomis; Melitaea neumoegeni; Lycaena speciosa;* etc. Send lists. Dr. John A. Comstock, Southwest Museum, 4699 Marmion Way, Los Angeles, Calif.

WANTED.—Ants from all portions of the United States for determination or exchange. Will also exchange other insects for ants. M. R. Smith, Assistant Entomologist, State Plant Board, A. and M. College, Miss.

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BULLETIN
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Vol. XXII June, 1927 No. 3

PSITHYRUS LABORIOSUS, AN UNWELCOME GUEST IN THE HIVES OF APIS MELLIFICA.[1]

By O. E. Plath, Department of Biology, Boston University.

In their comprehensive treatise on bee culture, A. I. and E. R. Root[2] discuss the various major and minor enemies of the hive-bee, including such insect pests as ants, wasps, and dragon flies. I should here like to call attention to another insect enemy which these authors do not mention.

Since the summer of 1922, I have kept from two to five colonies of hive-bees in connection with my work on bumblebees, and have very often found dead, or paralyzed, females of *Psithyrus*[3] *laboriosus* in front of my hives. These dead, or dying, bees were usually more or less denuded of pile (*cf.* figs. 1 and 2), and in a few cases the antennae, wings, and tarsi were also badly mutilated. Furthermore, I have frequently noticed that the females of this Psithyrus, and occasionally also a queen or worker of some of the non-parasitic bumblebees, make determined attempts to enter the hives, even after they have been repeatedly repelled by the guards.[4] These observations led me to conclude that the

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[1] Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University. No. 282.

[2] The A B C and X Y Z of Bee Culture. The A. I. Root Company, Medina, Ohio, 1923.

[3] A genus of bumblebees whose members are social parasites on various species of the genus Bremus, the industrious branch of the bumblebee family (Bremidae).

[4] Dr. William M. Warren, Dean of the College of Liberal Arts, Boston University, informs me that he has made similar observations.

Psithyrus females had attempted to gain admittance to the hives, and that the guards had summarily "executed" them, without any serious sacrifice on their part. However, as will be seen later, I was mistaken in the last part of my assumption. Before going into this matter, it seems desirable, however, to give a brief account of the life-history and habits of these interesting social parasites.[5]

Both sexes of the genus Psithyrus so closely resemble those of the genus Bremus that anyone, other than a specialist, would see no difference between them. It is quite easy, however, to tell a Bremus from a Psithyrus female because the latter lacks corbiculæ, or pollen baskets. Having no apparatus for collecting pollen, the Psithyrus female is unable to found a colony of her own, but, like the European cuckoo and some of our American cowbirds, lays her eggs in the nests of her more industrious cousins. The latter rear the larvæ of this lazy guest, instead of their own, which are destroyed by the intruder.

That the Psithyrus female does not always gain admittance to a Bremus colony without a struggle is indicated by the frequent discovery in bumblebee nests of dead or disabled Psithyri or Bremi, and is confirmed by direct observation when a Psithyrus first enters, or is placed in, a Bremus nest. In these encounters, the Psithyrus has a great advantage over the members of the Bremus colony. She has a powerful sting, and her integument is so thick that her opponents are unable to penetrate it with their stings; but she is vulnerable in certain places—*e.g.*, the neck—and it is chiefly for this reason that she is not always successful. Thus on June 22, 1923, a female of *Psithyrus laboriosus* entered one of my nest-boxes containing a colony of *Bremus terricola*, she herself and fifteen workers being killed during the ensuing battle. Two weeks later this same colony was visited by another *Psithyrus laboriosus* female, and this encounter likewise resulted in the death of the intruder and more than a dozen workers.

What takes place during such an encounter is illustrated by some experiments which I performed several years ago by placing a female of *Psithyrus laboriosus* or *Psithyrus ashtoni* in a large colony of *Bremus impatiens*. As soon as the Psithyrus was introduced a great uproar arose in the colony. The workers rushed madly in every direction searching for the source of the disturbance. The Psithyrus was seized almost immediately by numerous workers who tried to sting her, and was thus made absolutely helpless. A few bellicose workers, unable to get hold of the intruder, seized some of their fellows in the struggling mass, and attempted to sting toward the center. On one occasion such a fighting mass was lifted out of the nest-box with a pair of forceps, and when the workers finally released their hold, it was found that the ball had consisted of seventeen workers and the Psithyrus. The latter and four of the workers were severely stung and died within a short time. Although the Psithyrus female made vigorous attempts during the struggle to sting her adversaries, one of the four workers was stung to death by another worker at the periphery of the mass, and it is possible that the other three may have met death in the same way. This treatment of *Psithyrus laboriosus* by a colony of *Bremus impatiens* is similar to the behavior of a colony of hive-bees toward a newly-introduced queen. Such an attack, usually known as " balling," is described as follows by the Roots: " Very often when the bees decide they will not accept the queen let loose among them they will begin to pull at her, pile on her in such numbers that they form a ball around her. Every bee in the ball will seem intent on pulling her limb from limb. Unless the owner comes to her rescue she may be stung to death or suffocated." To this account I may add that on one occasion I found a large number of dead, or dying, workers on the floor of one of my hives, and I am of the opinion that most, if not all, were killed by the workers on the periphery of the large ball which had formed about the newly-introduced queen.

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[5] For a more detailed account of the life-history and habits of our American Psithyri, *cf.* Plath: Notes on *Psithyrus*, with Records of Two New American Hosts. Biol. Bull., Vol. 43 (1922).

However, as will be seen from the following incident, a battle between Bremus workers and a Psithyrus may have quite a different ending. On July 24, 1921, nineteen workers of a colony of *Bremus impatiens,* which had been transferred to one of the Bussey buildings on the preceding day, were caught at the old nest site and placed in a glass jar. A few minutes later a female of *Psithyrus laboriosus* was discovered on some comb which had been left in the empty nest cavity of a colony of *Bremus fervidus.* Just to see what would happen, the Psithyrus was also placed in the jar. All of the inmates, including the Psithyrus, were ill at ease and tried to escape, but one or two of the workers nevertheless attacked the Psithyrus as soon as they came in contact with her. The latter now went on the warpath herself. She quickly seized one worker after another, whether attacked by them or not, rolled them below her abdomen and stung them to death. This done, she seemed to feel quite at home in the jar, and began to lap up the honey which was oozing from the bodies of her victims. From what has been said before, it is evident that this encounter might have ended quite differently if it had taken place in a bumblebee nest.

It will now be interesting to know what happens when a Psithyrus enters a hive containing a strong colony of *Apis mellifica.* In the early afternoon of July 2, 1925, I visited my two hives, No. 1 containing a medium-sized colony of three-banded Italians, and No. 2, a strong colony of Carniolans. I noticed several workers, with their abdomens curved below the body, hurriedly crawling out, and away from the entrance of hive No. 2. From previous observations I knew that these individuals had been stung. This led me to suspect that the colony was giving battle to a Psithyrus, a surmise which was corroborated a few seconds later, when a female of *Psithyrus laboriosus,* with about a dozen workers of *Apis mellifica* clinging to her legs, antennæ and wings, came slowly crawling out of the entrance. In trying to throw off her enemies, the Psithyrus lost her footing, and more bees joined the fray as she began to struggle with her assailants. As in the case of *Bremus impatiens,* those workers which were unable to get

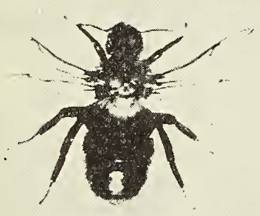

Fig. 1

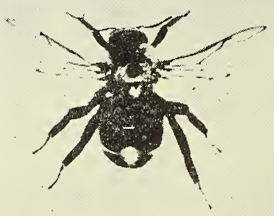

Fig. 2

Fig. 1. Normal female of *Psithyrus laboriosus.* Natural size.

Fig. 2. Female of *Psithyrus laboriosus* killed by a colony of *Apis mellifica.* Natural size. As will be noticed, the workers have denuded the intruder of most of her pile.

hold of the intruder seized one of the workers clinging to the Psithyrus, and in this way a ball, about two inches in diameter, was formed. After a few seconds the ball fell from the alighting board to the ground—a distance of about three inches—and the resulting jar caused many of the bees to release their hold. However, a considerable number refused to let go of the intruder until several minutes later, when the Psithyrus had become so paralyzed that she was no longer able to crawl. This was also true of four of her adversaries, while about a dozen others were only partially paralyzed. Several of these were placed in a box, but all died within a short time.

From these observations it is evident that wherever *Psithyrus laboriosus,* or other members of this genus are common, they must be considered as a minor enemy of the hive-bee.

COLLECTING NOTES ON EUREMA LISA (BDV. & LEC.) IN THE VICINITY OF FALL RIVER, MASSACHUSETTS.

By Wm. Prescott Rogers.

October 14, 1920.—A fresh male in opening of cut over Woodland at extension of Robeson St. (Dr. E. T. Learned.)

September 21, 1921.—Fresh male in open field off Bell Rock Road flying about fall dandelion and goldenrod.

October 16, 1921.—One female and two males in fair to good condition on fall dandelion near 14th tee of the Rhode Island Country Club, Nyatt, R. I.

October 20, 1921.—A fresh male in front yard of Border City Mfg. Co., Fall River, Mass.

October 30, 1921.—A male in good condition taken on fall dandelion on the lawn of Mr. Charles H. Durfee's estate, Tiverton, R. I.

September 10, 1922.—Fresh male on old 3d green of the Duxbury, Mass., Golf Club.

September 1, 1924.—Two fresh males on fall dandelion on 13th fairway of Rhode Island Country Club, Nyatt, R. I.

July 10, 1926.—Fresh male taken on the 6th fairway of the Fall River Country Club.

This latter capture is first *lisa* taken in our vicinity in any year previous to September, despite constant search. We should be interested to hear whether other Massachusetts lepidopterists ever find this species in abundance north of Fall River.

1926 COLLECTING NOTES ON KANSAS COLEOPTERA.

By W. Knaus, McPherson, Kansas.

The collecting season of 1926 in the Sand Hills near Medora, Kansas, yielded a number of surprises in Coleoptera, especially in Scarabeidae.

The seasons of 1924–25 *Canthon lecontei* Harold were plentiful, but they had entirely disappeared by 1926, not a single specimen being found.

The small, light colored *Aphodius knausi* Fall came to light in abundance the first and second weeks in July. They were not observed in cattle droppings during the day.

May and June and again in August–September, a few specimens of the very small *Onthophagus oklahomensis* Brown (in Ms.) were found in horse droppings. Mr. Brown found this species fairly common in sandy soil under horse droppings near Stillwater, Okla. So far as known Medora is the northern limit of this species. *Odontaeus filicornis* Say was taken in limited numbers at light the first half of July. This species is not taken except at light. *Bolbocerus fossatus* Hald. was scarce, only one coming to light and two others found in their burrows.

Glaresis inducta Horn came to light sparingly the first part of July, six specimens being taken. So far it has been taken only at light.

Diazus rudis Lec. was fairly common on afternoons the first ten days in July.

Polyphylla hammondi Lec. were taken at light the first half of July, but never more than one in five was a female.

For the first time in forty years collecting in this region, the rare *Serica ochrosoma* Dawson, was taken in numbers that might fairly be called abundant. In past years one or two specimens a season at night, the latter part of May or the first week in June, was considered a good catch. Last season the first and second weeks in June on two evenings at light over 60 specimens were taken. They flew to light almost noiselessly and either stuck to the sheet or fell to the bottom of the sheet, and were taken without effort. So far, the food plant has not been observed. *S. sericea* Ill., the other species of Serica found here, feed on Maple foliage the early part of May.

In 1923 a few specimens of a *Strigodermella,* described last year by W. J. Brown, of the A. and M. College, Stillwater, Oklahoma, as *knausi,* were taken on July 4th. Last year, July 4th and 5th, while collecting with J. W. McColloch and family, of the State Agricultural College, Manhattan, they were found in abundance mating and flying to various plants on the more or less bare sand. They were most abundant from 8 to 10 o'clock in the morning. They could be easily taken with a net or by picking them up from the sand or from vegetation. In the material before Mr. Brown when describing the species the male was not present. I first took the species about 20 years ago, by sweeping grass with a net about six or seven o'clock in the evening at Rago, Kingman County, Kansas, and it was distributed to collectors as *pygmaea* (Fab.), the small Atlantic Coast form that ranges from New Jersey to Florida.

Anomala flavipennis Burm. and the color variety *modulata* Csy. were extremely abundant at light the last week in June to the third week in July.

Anomala ludoviciana Sch. was fairly abundant the first week in July, appearing on sand and low vegetation mating near sunset. Rarely coming to light. Food plant unknown as specimens have not been observed feeding.

On May 22nd, about 7:00 o'clock in the evening, *Carpophilus melanopterus* Er. var. *rufus* Murr., were taken in numbers, feeding and mating on the tender buds of the flower stalk of the Yucca. I had never before taken this *Carpophilus* except an occasional separate specimen.

A single example of the Cerambycid, a fine male of *Saperda calcarata* Say, alighted on my arm, and of course was taken, July 4th. This was the first record of this species from this locality.

Tetraopes canescens Lec. seems to be present each year in about the same numbers, varying with the scarcity or abundance of the broad leaved milk weed, upon which they mate and feed.

Eleodes hispilabris Say, form *nupta* Lec., is one of the largest and rarest of the Tenebrionids found in this locality; they wander around at night feeding and may be picked up along roads. They hide during the day in rodent burrows, and occasionally under cattle droppings.

May and June of 1926, several of the large, black Curculionids, *Sphenophorus maidis* Chittenden were taken just at the base of stems of a large coarse bunch grass known commonly as "Corn" grass, in the stems of which the female inserts one or more eggs and within which the larvae feed and pupate. From this grass later in the season the insects migrate to corn stalks, each stalk so infested with a larva being checked in growth and producing no ears.

On May 2nd, on the bank of the Smoky Hill river three miles southeast of Marquette, a single example of *Cychrus elevatus* Say was taken; another specimen of this species was taken over forty years ago on the same river bank, three miles southeast of Salina.

OBSERVATIONS ON EUPLECTRUS PLATYHYPENAE HOW. (CHALCIDAE), A PARASITE OF NOCTUID LARVAE.[1]

By Roger C. Smith, Kansas Agricultural Experiment Station,
Manhattan, Kans.

Early in June, 1926, the variegated cutworm, *Lycophotia margaritosa* Haw., was very plentiful in various localities in Kansas. This insect had not occurred in any numbers in the state since 1920. An outbreak with some damage was expected, but it did not occur chiefly because of prompt action on the part of the predators and parasites. The most abundant and effective Hymenopterous parasite observed was *Euplectrus platyhypenae* How. An opportunity was, therefore, provided to make some observations on its life history and habits because of its abundance. In spite of the fact that it is supposed to be a common Noctuid parasite, it has not been reported as a parasite of the variegated cutworm, and it has never been seen by the entomologists of this station on any hosts. It has not been encountered in seven seasons of study of alfalfa insects. Since it has such striking habits, and since so little has been recorded about it, these illustrations and rather fragmentary observations may be of interest.[2]

History and Review of Literature.

This parasite was described by Howard (1885) from adults bred from a larva of *Platypena* (*Platyhypena*) *scabra* Fabr. from the District of Columbia. The first biological observations of any consequence referable to this genus were published by Schwarz (1881), who gave an excellent account of *E. comstockii* How., a species very similar to this one. The habits of the two species are practically identical. A summary of Schwarz's account is given by Riley (1885), with three original illustrations. Vickery (1926) gives a brief but excellent account, with one photograph, of this parasite attacking *Cirphis latiuscula* (H. Sch.) in Texas. His observations are in complete accord with those made in the course of these studies. Swezey (1926) stated that this parasite had been introduced into Hawaii in 1923 to assist in the control of army worms. Large numbers have been bred and distributed over the islands where they have proved to be a valuable addition to the army worm parasites.

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[1] Contribution No. 354 from the Entomological Laboratory, Kansas State Agricultural College. This paper embodies some of the results obtained in the prosecution of project No. 115 of the Agricultural Experiment Station.

[2] Acknowledgment.—The writer wishes to acknowledge his indebtedness to Mr. A. B. Gahan for the determinations of this parasite, to Mr. S. Fred Prince for the drawings, and Prof. F. C. Colburn for the photographs.

Hosts.—This species was described from specimens reared from the green clover worm, as the name indicates. It is recorded by Vickery (1915) as a parasite of the fall army worm (*Laphygma frugiperda* S. and A.), and three other Noctuids—*Heliophila unipuncta* Haw., *H. subpunctata* Haw., and probably from *H. multilinea* Walk. at Brownsville, Texas. He also stated that this parasite is attacked in some parts of the country by *Tetrastichus euplectri* Gahan. Mention has already been made of the host *Cirphis latiuscula* (H. Sch.) (Vickery, 1926) and of army worms by Swekey (1926).

During these observations, this parasite was taken on the variegated cutworm (*Lycophotia margaritosa* Haw. (Figs. 8 and 9), the green clover worm (*Platypena scabra* Fabr.), the forage looper (*Caenurgia erechtea* Cram.), the celery looper (*Plusia simplex* Guén), and a larva closely resembling the corn earworm (*Heliothis obsoleta* Fabr.). In all cases, these parasites successfully reached maturity and the adults emerged. There were several times as many variegated cutworms attacked by the parasites as of all other hosts combined. During the latter part of June and early July, 1926, an average of 20 per cent. of the larvae collected by sweeping were parasitized by this species.

Life History.—The oblong, oval, brownish-black eggs were generally deposited on the dorsum of the thorax of the host larvae when the hosts were half to nearly grown. Sometimes they occurred on the abdomen and not always on the dorsum (Fig. 8). They were laid in patches, which to the unaided eye appeared like a small, black spot. Sometimes they reminded one of a fleck of soot. The eggs (Fig. 1) are separated about equidistant from each other. The color at oviposition was not ascertained, but all eggs seen were shining brownish black, or dark shining chocolate brown. They measured 0.34 mm. long and 0.17 mm. in diameter. The eggs were securely glued to the host. They were laid in groups, 26 being the largest number seen on one larva.

Hatching occurred by the larva rupturing the shell along the mid-dorsal line (Fig. 2). The line of cleavage is straight and the larva gradually grows out of the shell. The two halves of the shell slipped down the sides of the embryo and were left on the back of the host. In a group of eggs, one often observed all stages of hatching with some unhatched eggs and some larvae (Fig. 2).

The length of the egg stage was not definitely determined. Oviposition was never observed, but embryonic development requires at least two days. The period is probably between two and three days, as Schwarz (1881) described for *E. comstockii.* The interval must be short, for if the host should molt before the eggs hatched, they would be cast off with the exuvium and the young larvae would perish. This, however, was never observed to take place.

The Larva.—The larva was a footless, gray, soft-bodied creature without clearly differentiated regions (Figs. 3–6). Vickery (1926) stated that the color was greenish-yellow when feeding on *Cirphis latiuscula,* and darker green when feeding on *Laphygma frugiperda.* All of our material was distinctly gray with at times a tinge of yellow. The parasite larva spent its entire life as an external parasite on the host. During hatching, the head of the parasite was extended somewhat beyond the shell, enabling the needle-like mandibles to pierce the body wall, and the larva fed upon the exuding body fluids. The parasites appeared to gradually expand in size. Growth proceeded rapidly, maturity being reached in four to six days. The space between the parasites was soon taken up and the group of parasites presented a piled-up appearance (Figs. 3, 8, 9). It was first thought that they were holding on by their mandibles, but it was found that this was not necessarily the case. It was found that the egg shell holds the first instar larva in place. The first exuvium lies under the larva and holds it to the old egg shell and host. The second exuvium occurs above the first. It is in this manner that the whole of the dark-brown somewhat gelatinous mass (Fig. 6) beneath the larva which holds it in place is formed. This and similar methods of holding on have been described by Cushman (1926). It is not necessary, therefore, that the parasite keep its mandibles inserted into the host to hold on. The parasite remains in normal position when it and the host are preserved in formalin or alcohol. The character of the surface of the cuticula of the parasites also causes them to adhere somewhat to each other (Fig. 3).

There was no observed migration of parasites to unparasitized larvae. In fact, the parasites practically never shifted their positions. Their movements were exceedingly slow and appeared to be aimless. It was found impossible to transfer parasites to unparasitized larvae and have them mature. Schwarz also found this impossible with *E. comstockii.*

The exact number of molts could not be determined, but it is at least two. In one case, a larva was observed to be in the process of molting, and a brownish dried exuvium was found beneath it. Since this parasite appeared to be nearly grown, there may be only two molts.

The parasites ceased feeding before molting and withdrew their mandibles. The cuticula became dull in appearance. Molting was effected by the splitting of the old cuticula in the mid-dorsal line. The rent was gradually widened and the old cuticula slipped down the sides of the larva similar to the manner in which the egg shell did at hatching, and was left beneath the parasite on the host. The larval movements involved were few and rather indefinite or irregular.

The morphological features of the larvae reminded one of other chalcid larvae. The head was poorly differentiated, except in the fully grown parasite where it appeared similar to the head of a small caterpillar. It could always be determined by finding the mandibles. There was present a pair of very short and inconspicuous antennae. Eyes were absent or at least they were not found. The mouth was readily located. It appeared as a small slit within which were the rather peculiar mandibles. The mandible may be described as short, sharp, stout spines protruding from the apex of a semi-circular chitinous plate. Judging from their appearance and movements, they functioned by piercing the body wall of the host and the exuding fluids were then sucked up.

At first the segmentation of the body was very indefinite, but soon after feeding began, the segments could be differentiated. The body consisted of 12 segments. There were three pairs of small spiracles on the thorax and six pairs of larger ones on the abdomen. When fully grown and ready to spin, the average length of four larvae was 2.6 mm. and the largest diameter was 1.4 mm.

The posterior end of the abdomen, consisting of the last three segments, was extensile, tubular and highly movable. The silk was spun from the anus (Fig. 6) and the coarse pupal protection

(Fig. 7, 10), for it was scarcely a cocoon, was fashioned by this portion of the body. It could be extended to reach half way to the head. It touched the substratum, the dead host larva or itself, and exuded a drop of clear gelatinous fluid which was then drawn out into a coarse thread. This process was continued until the parasite was enveloped by this webbing within which pupation took place. It required at least two hours to accomplish this. All the movements were very slow and indefinite. The extensile portion or " tail " had two pairs of small papillae at the end surrounding the anal opening.

Beneath the transparent integument one could see masses of fat cells. The imaginal discs were likewise readily seen. There were three pairs of large ones seen in the dorso-lateral region of the thorax, and three pairs of smaller ones from the venter for the pupal legs. These discs were all flat sacks with relatively long stalks.

The larvae were gregarious and lived together (Fig. 3) until the pupal protection was spun, then they scattered somewhat, endeavoring to move around to the ventral side of the dead host to spin their flimsy cocoons. Often the cocoons were in rather definite rows on the underside of the blackened and shrivelled skin of their dead host (Fig. 10). Schwarz described similar behavior for *E. comstockii.* Practically all of the larvae reached maturity and were spinning at the same time. In several cases, the host appeared to die too soon and some of the parasite larvae died before reaching the spinning stage. In another case, a parasite larva was observed to bite and begin to feed upon its neighbor. Since there were often dead larvae in the groups, it is believed that the parasites may feed upon each other, though this is perhaps not a frequent occurrence.

The Pupa.—About a day after spinning, the parasite changed to a light brown pupa which later became almost entirely black. The pupal stage lasted four to seven days, five and six-day intervals predominating. The adults forced their way out of the cocoons, tearing the fibers or pushing them aside.

The males were somewhat smaller than the females. Their behavior as to feeding, copulation and phototropism conformed to that of other closely related forms. Adults were fed on water, sweetened water and mashed host larvae. The longest period any adults survived was a little over two weeks. While they were rather long lived, none could be kept alive for as long a period as has been reported by other investigators. Egg-laying was not observed, but the actions of the parasites incident to it were observed. The adult parasites alighted on the thorax of the host larva and held on in spite of various movements of the host, which are sometimes almost violent, to dislodge them. The host cannot reach them in this region, so the eggs are generally deposited there. It is presumed that the female holds on until all of the eggs are deposited.

All parasitized host larvae were collected on the alfalfa plants, usually by sweeping. No parasitized larvae were taken under loose soil or trash in the fields, a common hiding place during the day for this species. The parasitized larvae refused to eat after the parasites hatched, and they always died a short time before the parasites began to spin.

Inducing parasitism with reared adults was unsuccessful in many trials on all species of larvae tried. Furthermore, they were not observed on any kind of larvae during the remainder of the season, though a constant watch was maintained for them. They could not be found at Hays, Kansas, on two collecting trips in August, though they had been plentiful there early in July. They disappeared as suddenly as they came, so there is nothing to report on their later activities, nor how they normally over-winter. It is, however, interesting to note that Vickery (1926) reared them in October, November, December, March and April. This state may, therefore, prove to be the northern limit of its range, and thus explain its rare occurrence.

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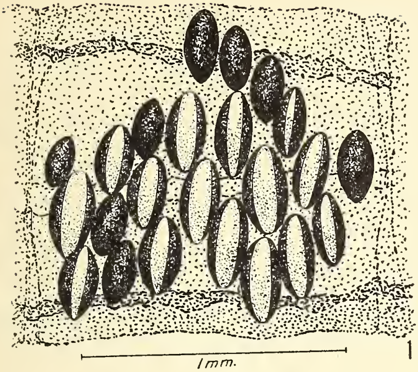
Explanation of Plate.

1. A group of eggs of *Euplectrus platyhypenae* How. glued to the dorsum of a nearly grown larva of the variegated cutworm (*Lycophotia margaritosa* Haw.) in the process of hatching.
2. Detailed drawing of an egg in process of hatching. The larva begins to feed at this stage and segmentation becomes apparent.
3. A group of half-grown parasite larvae in situ.
4. and 5. Larvae moving or shifting position. Note the exuviae beneath the larva by which it holds on to the host.
6. A grown parasite larva beginning to spin.
7. Prepupa enveloped in their flimsy cocoons.
8. Nearly grown variegated cutworm with a mass of parasites located dorsolaterally on the abdomen.
9. Same, but with a group of grown larvae in situ on thorax.
10. A dead host larva with cocoons of the parasite beneath it.

Progress of Economic Entomology in Missouri.—In Growers' Bulletin No. 34 on " Reed's Insecticides and Their Effect on Soil Insects," published by the United Sales Company of Carthage, Missouri, there appears on page 9 a testimonial signed by the assistant prosecuting attorney, the deputy recorder, a shoe merchant, two clothing merchants, two dry goods merchants, the county collector, two bank cashiers, the janitor of the courthouse, the deputy county collector, a probate judge, the deputy county clerk, an editor, the county assessor, the chief of police, the county agricultural agent, the secretary of the chamber of commerce, a real estate agent, a capitalist, two judges and two persons, presumably citizens and taxpayers.—HARRY B. WEISS.



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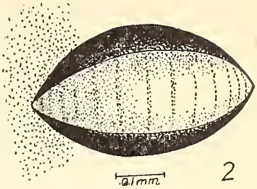

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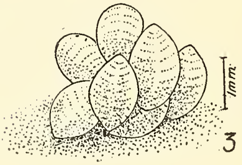

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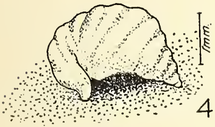

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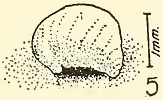

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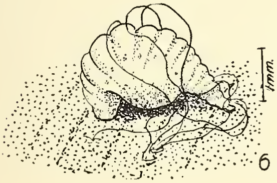

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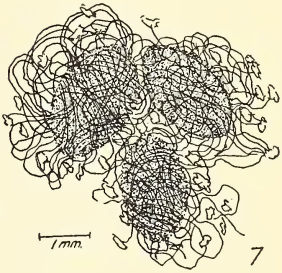

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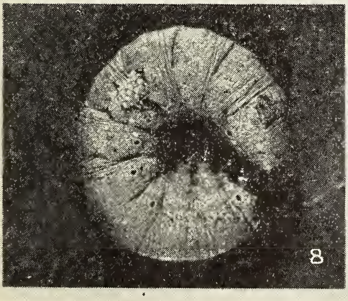
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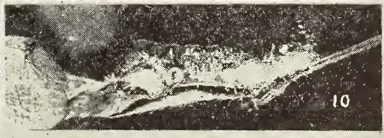
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NEW SPECIES AND A NEW GENUS OF DERAEOCORINAE FROM NORTH AMERICA (HEMIPTERA, MIRIDAE).[1]

By Harry H. Knight, Ames, Iowa.

The present paper describes two new species and a variety of *Deraeocoris,* two new species of *Eustictus,* two new species of *Eurychilopterella,* and a new genus and species allied to *Eurychilopterella,* all belonging to the Mirid subfamily Deraeocorinae.

Deraeocoris piceicola n. sp.

Runs in my key (Univ. Minn. Agr. Expt. Sta., Tech. Bul. 1, 1921, p. 111) to the couplet with *incertus* Kngt., but differs in the much larger size and structure of the genital claspers; size and aspect of *laricicola,* but differs in the punctate scutellum, genital claspers, and paler membrane.

♂. Length 7.3 mm., width 2.9 mm. Head: width 1.18 mm., vertex .58 mm.; eyes and shape of head much as in *laricicola* but frons more prominent and convex; black, a nearly triangular pale spot in midde of vertex, pale on basal angles of juga. Rostrum, length 2.8 mm., attaining posterior margins of the middle coxae, piceous, paler at the joints. Antennae: segment I, length .56 mm.; II, 1.9 mm., cylindrical, scarcely equal to thickness of segment I, exserted hairs nearly equal to one and one-half times thickness of segment; III, .77 mm.; IV, .56 mm.; black, somewhat shining. Pronotum: length 1.51 mm.; width at base 2.36 mm., anterior angles 1.03 mm., collar .86 mm.; somewhat more densely punctate than *laricicola,* chiefly black, the median line irregularly indicated in pale on basal half. Scutellum black, shining, basal angles and apex pale, rather shallowly and coarsely punctate, a short pubescent hair arising from each puncture. Pubescence nearly as in *laricicola,* coloration more distinctly black although hemelytra have pale areas. Membrane pale, veins and invading membrane each side fuscous, apical half infuscated but the central area not darkened as in *laricicola.* Ventral surface and legs black, hind femora somewhat paler, tibiae biannulate with paler. Genital claspers distinctive, left clasper nearly as in *kennicotti,* but right clasper longer, more gradually tapered from base toward apex.

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[1] Contribution from the Department of Zoology and Entomology, Iowa State College, Ames, Iowa.

♀. Length 6.9 mm., width 3.2 mm. Head: width 1.24 mm., vertex .62 mm. Antennae: segment I, length .59 mm.; II, 2.04 mm.; III, .80 mm.; IV, .56 mm. Pronotum: length 1.36 mm., width at base 2.26 mm., collar .86 mm. More robust than the male, hemelytra shorter, membrane not or scarcely covering apex of abdomen; coloration somewhat lighter, median line of frons pale and usually joining with the white triangular mark on vertex, venter with some pale on each segment.

Holotype: ♂ August 20, 1925, Pingree Park, alt. 9,000 ft., Colorado (H. H. Knight); author's collection. *Allotype:* same data as the type. *Paratypes:* 3 ♂ 9 ♀, taken with the types on spruce (*Picea*), only on trees badly infested with aphid galls. COLORADO—♀, topotypic, Aug. 20, 1924 (Drake & Hottes). 14 ♂ ♀ Aug. 1, 1900, Rices Spur; 2 ♂ Aug., 1900, Rico (E. D. Ball). BRITISH COLUMBIA—♀ Aug. 8, 1913, Simpson Pass; ♀ Aug. 14, 1921, Barkerville (E. R. Buckell). ♂ July 20, 1926, Revelstoke, alt. 6,000 ft. (J. McDunnough).

Deraeocoris balli n. sp.

Allied to *vanduzeei* Kngt., but differs in having longer antennae, segment II greater than width of head plus width of vertex, scutellum not so abruptly convex, while scutellum and calli are uniformly yellowish red. In my key to the species of *Deraeocoris* (Minn. Agr. Expt. Sta., Tech. Bul. 1, 1921, p. 173), *balli* runs to couplet 6 where it does not agree with either section due to the uniformly yellowish red calli.

♀. Length 5.8 mm., width 2.9 mm. Head: width 1.03 mm., vertex .53 mm.; yellowish to reddish brown, without black marks. Rostrum, length 2.4 mm., reaching to middle of hind coxae, yellowish to brownish. Antennae: segment I, length .50 mm.; II, 1.63 mm., more distinctly thickened on the apical one-fifth than in *vanduzeei*, yellowish to reddish, the thickened portion blackish, apparently more sparsely clothed with long hairs than *vanduzeei;* III, .74 mm., brownish to fuscous; IV, broken. Pronotum: length 1.33 mm., width at base 2.31 mm.; punctuation and the long, erect yellowish pubescence much as in *vanduzeei*, but calli and disk uniformly reddish yellow; basal margin and more broadly on lateral margins pale to yellowish. Scutellum strongly convex but not so abruptly at sides and apex as in *vanduzeei;* uniformly reddish brown, smooth, shining, set with erect yellowish hairs.

Hemelytra shining, strongly punctate much as in *vanduzeei,* but clothed with longer and more prominent erect yellowish hairs; apical area and spot on middle and base of corium dark brown to fusco-brownish, apical area of embolium reddish to dark brown, apex and more broadly on basal area of clavus dark brownish, otherwise pale to yellowish between the punctures and dark areas. Cuneus red, basal half chiefly pale, narrow base invaded by the dark color on apex of corium. Membrane clear with a tinge of brownish, veins brown, darker at tip of smaller areole, anal area dark. Legs pale to yellowish, femora reddish on apical half although indistinctly biannulate with pale near apex; tibiae biannulate on basal half with reddish, basal band oblique and very narrow; tarsi yellowish, tips darker, claws dark brown and deeply cleft; clothed with erect long hairs as in *vanduzeei.* Venter yellowish to reddish, the red color prominent on sides and on the genital segments.

Holotype: ♀ August 3, 1900, Dolores, Colorado (E. D. Ball); author's collection. Dedicated in honor of the collector, Dr. E. D. Ball, who favored the writer with some remnants of unmounted Hemiptera which he collected more than twenty-five years ago. Dr. Ball's notes on this lot of Hemiptera state: "Pretty red Capsid on *Rhus elabca.*" The collection was made on terrain described as follows: "Just back of the town is a low mesa with occasional clumps of scrub oak and sarviceberry, a few shrubs of sumac, with a sparse desert covering of shad scale and other Atriplex, very sandy, very dry, and barren."

Deraeocoris triannulipes flavisignatus n. var.

Differs from typical *triannulipes* in having median line of pronotal disk pale, also more or less pale on lateral submargins of disk; apical half of membrane dark fuscous, set off from the areoles by a transverse paler area. Slightly larger and of deeper black color than the typical form from Colorado, still the pale rays on pronotal disk persist in this more eastern form. Apparently only a variety or race of *triannulipes,* although a slight difference can be detected in the genital claspers.

♂. Length 6.5 mm., width 3 mm. Head: width 1.11 mm., vertex .56 mm. Rostrum, length 2.1 mm., extending only slightly beyond hind margin of sternum. Antennae: segment I, length .50 mm.; II, 1.48 mm.; III, .62 mm.; IV, .56 mm. Pronotum: length 1.45 mm., width at base 2.5 mm. Very similar to the male in coloration, punctuation and pubescence.

Holotype: ♂ July 8, 1921, St. Anthony Park, Minnesota (H. H. Knight); author's collection. *Allotype:* topotypic. *Paratype:* ♂, taken with type at light. ♀ July 2, 1919, Mille Lacs County, Minnesota (V. R. Haber). ♀, Marquette, Michigan, "col. in washup."

Eustictus albocuneatus n. sp.

Distinguished from other members of the genus by the opaque white cuneus with black apex, and by the abbreviated black membrane.

♀. Length 6.1 mm., width 2.43 mm. Head: width 1.09 mm., vertex .44 mm., black. Rostrum, length 3.2 mm., extending slightly beyond posterior margins of hind coxae. Antennae: segment I, length .98 mm., pale, blackish only on extreme apex, set with several erect pale hairs which in length are nearly equal to twice the thickness of segment, an obscure fuscous point at base of each; II, 3.25 mm., pale to dusky, only minute setigerous fuscous points are apparent, clothed with fine, short pale pubescence, while five or six erect hairs arise near base; III, 1.91 mm., pale, dusky on basal one-third, also with minute fuscous points; IV, missing. Pronotum: length .99 mm., width at base 1.76 mm.; margined laterally by a white calloused carina, yellowish to fuscous, anterior half of disk including calli and collar, black.

Dorsum set with many, rather uniformly spaced, long, erect, yellowish hairs, present on cuneus and scutellum but not on embolium. Ground color pale yellowish to brownish, head, anterior half of pronotal disk, scutellum, inner apical area of corium, apex of cuneus, black; extreme edge of embolium black; cuneus except apex, opaque white. Membrane abbreviated, just attaining apex of abdomen, uniformly dark brownish black. Legs pale yellowish to brownish; tibiae with a black line on dorsal margin, becoming obsolete apically, the black line bordered with white; hind tibiae black with two white lines only near base. Venter yellowish to brownish and reddish, becoming black on genital segments and more or less on sides. Tibiae and femora set with erect long hairs, several on tibiae nearly equal to three times thickness of tibia.

Holotype: ♀ June 17, 1926, Tucson, Arizona (A. A. Nichol); author's collection.

Eustictus tibialis n. sp.

Allied to *necopinus* Kngt., but differs in that length of antennal segment III is scarcely equal to width of head; hind tibiae black, pale only at base and apex; antennal segment I is longer while segment III is shorter than in *necopinus.*

♀. Length 6.6 mm., width 2.6 mm. Head: width 1.11 mm., vertex .46 mm.; median line of vertex not so deeply grooved as in *necopinus.* Rostrum, length 2.84 mm., scarcely attaining posterior margins of hind coxae. Antennae: segment I, length .95 mm., thickness .178 mm., blackish, with a few obscure transverse pale marks, clothed with very fine, short pale pubescence; II, 2.4 mm., more slender at base, thickness .103 mm., tapering to thicker (.148 mm.) at apex, brownish black; III, 1.09 mm., thickness .118 mm., blackish, apical one-fourth pale to yellowish; IV, 1.02 mm., thickness .148 mm., blackish. Pronotum, length 1.27 mm., width at base 2.16 mm., black, extreme basal edge pale, a small paler patch near basal angles.

Pubescence and punctuation nearly as in *necopinus,* coloration of scutellum and hemelytra nearly the same. Differs in color of the legs, tibiae black, pale only at base and apex; femora blackish on apical half, hind pair with only one distinct, subapical pale mark on posterior face.

Holotype: ♀ June 23, 1917, Richmond, Texas (H. H. Knight); author's collection. *Paratype:*. ♀, taken with type at light.

Eurychilopterella barberi n. sp.

Differs from *luridula* Reuter in the smaller size, shorter second antennal segment, longer head, and the uniformly dark pronotum and scutellum.

♀. Length 3.3 mm., width 1.27 mm. Head: width .63 mm., vertex .296 mm., length .65 mm., extending .37 mm. beyond front margins of eyes; horizontal, sharply conical, gula slightly sulcate, eyes just reaching lower margin; smooth shining, uniformly yellowish, finely pale pubescent. Rostrum, length 2 mm., reaching base of ovipositor, yellowish brown. Antennae: segment I, length .18 mm.; II, .66 mm., slender, rather sharply thickened at apex; III, .266 mm.; IV, .31 mm.; yellowish, becoming fuscous on last two segments. Pronotum: length .73 mm., width at base 1.12 mm.; coarsely and closely punctate, shining, clothed with shorter pale pubescence than in *luridula,* lateral margins also sharper and more nearly straight; brownish black, impunctate, transversely rugulose, shining, finely pubescent.

Dorsum clothed with fine, pale, moderately prominent pubescence. Hemelytra pale yellowish translucent, corium and inner half of cuneus dark brown; membrane and veins uniformly pale brownish. Embolium narrower and margins more nearly straight than in *luridula.* Ventral surface of body dark brown; legs rather uniformly yellowish; hind tibia slightly curved.

Holotype: ♀ July 23, 1905, Huachucha Mts., Arizona (H. G. Barber); author's collection. *Paratype:* ♀, topotypic, Aug. 3, 1905 (H. G. Barber). Named in honor of the collector, Mr. H. G. Barber, who has very kindly favored the author with several interesting new species from Arizona.

Eurychilopterella brunneata n. sp.

Distinguished from *luridula* Reuter by the uniformly fuscous brown coloration, longer head and larger size.

♂. Length 4.7 mm., width 2.1 mm. Head: width .86 mm., vertex .385 mm., length .71 mm., extending .44 mm. beyond front margins of eyes; horizontal, flattened beneath, gula slightly sulcate, lower margin of eyes extending slightly below the gula. Rostrum, length 3.2 mm., reaching to base of genital segment. Antennae: segment I, length .29 mm., more slender on basal half; II, 1.26 mm., cylindrical, equal to thickness of segment I; III, .44 mm.; IV, .36 mm.; last two segments slender. Pronotum: length 1.18 mm., width at base 1.77 mm.; disk more distinctly flattened than in *luridula,* coarsely and closely punctate; calli confluent, smooth, smaller than in *luridula.*

Dark fuscous brown, pronotum slightly darker, head, collar, and legs more yellowish brown; membrane and veins uniformly brownish. Clothed with thickly set, erect, rather long yellowish brown pubescence. Genital structures very similar to those of *luridula.*

Holotype: ♂ Aug. 17, Clay City, Illinois; author's collection.

Conocephalocoris n. gen.

Allied to *Eurychilopterella* Reuter, but head longer and more cone-shaped; antennal segment III about equal to segment IV (in *Eurychilopterella* segment III distinctly longer than IV); antennal segment II thick, equal to thickness of segment I in both sexes; pronotum rather sparsely punctate, lateral margins of disk ecarinate; claws not distinctly cleft, arolia bristle-like and typical of subfamily Deraeocorinae; male genital segment apparently normally twisted to the left side. Genotype: *Conocephalocoris nasicus* new species.

Conocephalocoris nasicus n. sp.

♀. Length 4.4 mm., width 1.45 mm. Head: width .65 mm., vertex .37 mm., length .74 mm., extending .47 mm. beyond front margins of eyes; horizontal, sharply conical, gula flattened and more or less sulcate; basal carina scarcely distinguished, vertex with a broad impression near dorsal margin of eye and extending more shallowly across median line; eyes rather small, sparsely clothed with pubescent hairs, height .296 mm., width .78 mm.; base of antenna arising .148 mm. before front margin of eye, apex of segment I just able to reach apex of tylus; impunctate, vertex more or less alutaceous, sparsely pale pubescent; tylus long, prominent, approaching horizontal. Rostrum, length 2.72 mm., reaching slightly beyond middle of venter, uniformly brown. Antennae: segment I, length .296 mm., width .089 mm., barely reaching apex of tylus; II, 1.39 mm., cylindrical, equal to thickness of segment I, clothed with prominent pale pubescent hairs, length of some hairs equal to thickness of segment; III, .326 mm., thickness .059 mm., with prominent pubescent hairs; IV, .31 mm., slightly more slender than III. Pronotum: length .80 mm., width at base 1.24 mm.; calli prominent, confluent, disk coarsely but rather sparsely punctate, lateral margins ecarinate; collar rather flat, stricture distinct and punctate. Scutellum moderately convex, impunctate, minutely rugulose, somewhat shining, finely pubescent, set with a few erect long hairs as on hemelytra.

General coloration yellowish brown, calli and sternum darker brown; clothed with yellowish simple pubescence, dorsum set with sparsely spaced erect long hairs, forming three or four more or less distinct rows on corium and two rows on clavus. Hemelytra much as in *Eurychilopterella,* impunctate, shining, embolium narrower, yellowish translucent, otherwise uniformly yellowish brown; membrane clear with a tinge of brownish, veins scarcely darker, extending beyond apex of cuneus for a distance slightly greater than length of cuneus. Ostiolar peritreme opaque, finely granulate, the canal ending laterally in a small shining knob which is much smaller and not plate-like as in *Eurychilopterella.*

♂. Length 4.4 mm., width 1.3 mm. Head: width .64 mm., vertex .36 mm., length .78 mm., eyes and form nearly as in the female. Antennae: segment I, length .237 mm.; II, 1.26 mm., equal to thickness of segment I although somewhat more slender near base; III, .32 mm.; IV, .32 mm. Pronotum: length .75 mm., width at base 1.2 mm. Very similar to the female in form, pubescence, and punctation,

> but uniformly dark brown in color. Genital structures very similar to those of *Eurychilopterella* but the apex of segment turned slightly to the left, apparently in a normal position.

Holotype: ♀ June 24, 1925, Williams, Arizona (A. A. Nichol); author's collection. *Allotype:* July 3, 1925, Santa Rita Mts., Arizona (A. A. Nichol).

AN UNUSUAL CONDITION FOUND IN COLLECTING WATER BEETLES IN ARIZONA.

By D. K. Duncan, Globe, Arizona.

On the 25th of July, 1926, I motored to the Pinal Mountains, Gila County, Arizona, the base of which is situated some seven miles from Globe, Arizona. Reaching a point ten miles from Globe, Arizona, and at an elevation of some 5,000 feet, I stopped the car where a small creek crosses the highway and proceeded to do some beetle collecting from the shrubs near at hand.

As this creek was dry at the time, having water in it only from January until the latter part of May, I paid no attention to it, and the collection of water beetles was a far thought, as the nearest water would be on top of the mountain some five or six miles away.

Returning to the car for my net I was surprised to hear the sound of what I took to be rain on the car roof. Upon investigating I found not a cloud in the sky and the noise was made by dozens of water beetles hitting the roof every few moments. By standing on the rear fender I was able to gather about ten per cent. of these, as they would hit and bounce, roll over, and rapidly take wing again, also many struck beyond the reach of my arm. Within fifteen minutes I had gathered the following: 3 *Helichus* sp., 2 *Agabus lugens* (Lec.), 1 *Hydroporus pinguis* (Fall.), 1 *Hydroporus vilis* (Lec.), 53 *Deronectes aequinoctialis* (Clk.), 89 *Deronectes striatellus* (Lec.).

As my time was limited and I was obliged to return to Globe by noon, I stopped taking them although they were still coming. The time was 11:05 A. M., bright sunlight and rather hot. Many of the beetles were covered with mud. The question arises as to why they should pick out the car top to alight, unless they mistook it for a pool of water, and also why they should be flying at that time of day. They must have been at quite a height to see the car top.

SOME NEW AMERICAN TACHINIDAE (DIPTERA).[1]

By C. H. Curran, Ottawa, Ont.

In the following pages I present descriptions of several new species of North American Tachinidae and in some cases keys for the separation of the species. The determination of the members of this family is extremely difficult since no reliable key to the genera is available. In this paper I recognize two Palaearctic genera not previously recorded from North America. A further comparison of the forms occurring in America and Europe will undoubtedly result in the recognition of additional genera common to the two regions.

Gymnosoma occidentale n. sp.

Allied to *fuliginosa* but smaller, the genital claspers curved downwards at apex, not straight.

Length, 5 to 6 mm. *Male.* Face silvery yellowish white; oral bristle weak, a few bristly hairs near it. Front bright brassy yellow; the median vitta shining brownish red, in some lights brassy above, a little widened below; reaching quite to the antennae; its margin with about eight black, fine bristles; a second row of shorter, finer bristly hairs toward the orbits. Occiput white; broadly shining black above; white haired on white portion; with a row of black cilia above. Cheeks white pilose. Antennae reddish, first joint brownish above basally; third brown, its base reddish; third joint as long as half the width of the front at base of antennae, its sides parallel, its apex rounded, not acute.

Mesonotum before the suture golden yellow pollinose; similarly colored pollen on the anterior half behind the suture, its posterior margin convex; on either side of the middle line, with a narrow shining stripe, these slightly divergent posteriorly; on either side of these with an oval shining spot, not passing the suture. Posterior of mesonotum shining black. Pleura yellowish white pollinose. Pile wholly black; bristles on sides of mesonotum not strong. Scutellum shining black, its apex narrowly golden pollinose.

Legs entirely black, shining, black pilose. Wings greyish hyaline, their bases yellow. First posterior cell less angulate posteriorly than in *fuliginosa.* Squamae whitish yellow.

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[1] Contribution from the Division of Systematic Entomology, Entomological Branch, Department of Agriculture, Ottawa, Ont.

Abdomen shining reddish yellow; the first segment wholly, and a small roundish spot on the apex of the second, third and fourth segments black, the first connected with the black of the first segment by nearly the width of the spot.

Holotype: ♂, Vernon, B. C., July 28, 1920 (M. H. Ruhmann), No. 576 in the Canadian National Collection, Ottawa. *Paratypes:* ♂, same data; ♂, Vernon, July 23, 1920 (N. L. Cutler); ♂, Jordan, Ont., August 8, 1914 (W. A. Ross); ♂, Seton Lake, Lillooet B. C., June 1, 1926 (J. McDunnough).

Cryptomeigenia flavibasis n. sp.

Allied to *C. muscoides* Curran, but the female has the sheath of the ovipositor undeveloped and the male has a narrower front. Length, 7–7.5 mm.

Female.—Front two-thirds as wide as eye; about nine frontals, the lower three below base of antennae, the upper two reclinate, the next to the upper strong; two pairs of orbitals, the anterior strong one situated at the upper third of the front; ocellars strong; outer verticals one-third as long as verticals, weak; occipital cilia extending to lower third of eyes, these continued as coarse hairs to the cheeks, a second row of black bristles behind them and a third on the upper fifth of the head; occipital pile pale yellowish; hair of cheeks mostly fine and yellow but black across the middle; parafacials with sparse short black or yellow hairs. Cheeks five-twelfths the eye height; parafacials one-third wider than third antennal segment at middle, half as wide as distance between vibrissae. Palpi pale yellowish with black hairs; antennae reddish, the third segment largely brown, whitish pollinose, third segment about two and one-half times as long as second, slightly tapering; arista black, thickened and reddish on basal fifth. The head is densely clothed with gray pollen which has a golden tint on the parafrontals and occiput above.

Thorax and scutellum thickly gray pollinose, on the dorsum with yellow tinge, the vittae moderately conspicuous. Acrosticals and dorsocentrals 3–3, sternopleurals 2–1, three pairs of strong marginal scutellars, the apical pair somewhat divergent, the apicals sometimes represented by one or two hairs; a weak pair of discals. Hair of mesonotum and mesopleura black, on the pleura yellow.

Legs and coxae rusty reddish, thinly pale pollinose, black haired; tarsi black; coxae with pale pile and black bristles.

Wings with grayish tinge, the base, continued along the costa to the middle, yellowish. Squamae greyish hyaline, the border yellowish. Halteres yellow.

Abdomen densely yellowish gray or grayish yellow pollinose, with weak tesselation, the sides of the first two segments more or less broadly reddish yellow in ground color. First and second segment with one pair of strong marginals, the second with two weaker marginals connecting the median and lateral pairs and with a pair of strong discals; third with similar bristling but the marginals stronger; fourth with three irregular rows of bristles. Genitalia red; the sheath subtriangular, very small, never protruded.

Male.—Front two-fifths as wide as eye, the parafrontals about as wide as the wine-red frontal vitta; about twelve pairs of rather fine frontals, the three upper pair reclinate; outer verticals absent. Thorax more gray, hair of scutellum fairly long. Femora black except the immediate base, apical fourth below and the apex. Abdomen cinereous pollinose, the sides of the first three segments reddish yellow with broad black apices; second segment with two pairs of discals and without the connecting marginals.

Holotype: ♀, Meredoria, Ill., May 28, 1917; *Allotype:* ♂, same locality, May 29, 1917; *paratypes:* 2 ♀, same locality, May 28, 29, 1917; ♂, White Heath, June 24, 1916; ♀, Savanna, Ill., June 13, 1917. Types in collection of Illinois Biological Survey; paratype, No. 2226 in the Canadian National Collection, Ottawa.

PHYLLOMYA Desvoidy.

Myodaires, 213, 1830.

Neadmontia Townsend, Proc. Ent. Soc. Wash., xiv, 164, 1912.

The synonymy of *Neadmontia* Townsend is quite evident by comparison of the Nearctic species referable to *Phyllomya. Phyllomya volvulus* Fabr. has the apical cell open, *polita* has it less widely open, while *limata* Coq. has it closed almost in the margin. Other characters are quite the same. In the species described below the apical cell is moderately widely open. The species before me are separable as follows:

1. Apical cell open 2
   Apical cell closed just before the costal margin ..*limata* Coq.
2. First abdominal segment without discals 3
   First abdominal segment with pair of discals and usually four marginals (Europe) .... *volvulus* Fabr.
3. First two antennal segments reddish yellow, the third segment narrower than parafacial, slightly tapering .... *polita* Coq.
   Antennae wholly black, third segment wider than parafacial, broad, not tapering .... **fuscicosta** n. sp.

Phyllomya limata Coquillett.

Admontia limata Coq., Proc. U. S. N. M., xxv, 105, 190 (Idaho).

Aweme, Man., July 8, 1924 (N. Criddle).

Phyllomya polita Coquillett.

Admontia polita Coq., Can. Ent., xxx, 234, 1898 (N. Y., Fla.).

Bowmanville, Ont., August 1, 1913 (W. A. Ross).

Phyllomya fuscicosta n. sp.

Shining black, posterior wing veins basally and the squamae, yellowish. Length 8 mm.

Male.—Head silvery pollinose, the front above and the occiput except the orbits bare or nearly so. Front five-eighths as wide as either eye, the blackish frontal vitta slightly wider than parafrontal; ten to twelve pairs of frontals, the upper pair divergent, the lower pair below base of antennae; two or three pairs of orbitals; ocellars long; outer verticals but little longer than the long occipital cilia. Hair black, white on the occiput below the neck. Cheeks slightly over one-third as wide as eye-height; parafacials wide, with two rows of bristly hairs towards the inner edge, the outer row weaker. Palpi black; arista thickened on basal fourth, long pubescent, the penultimate segment one and one-half as long as wide.

Humeri conspicuously whitish pollinose, the pleura thinly so, the mesonotum with thin brownish gray pollen in some views. Acrosticals 2–2; dorsocentrals 3–3; 2 sublaterals; 3 intra-alars; sternopleurals 2–1, three pairs of marginal scutellars, the apical pair cruciate.

Pulvilli brownish gray, moderately long; middle tibiae with three anterodorsal bristles.

Wings with brownish tinge, broadly darker in front, paler behind; third vein with three basal bristles; posterior cross-vein oblique, sinuous, joining penultimate section of fourth vein at its apical third.

Basal fourth of second to fourth abdominal segments rather indistinctly whitish pollinose. First abdominal segment with a row of marginals, the median pair erect, the others sub-appressed; second to fourth segment each with row of marginals, the second and third each with pair of discals, the fourth with a row and scattered ones towards the sides.

Holotype: ♂, Seton Lake, Lillooet, B. C., May 28, 1926 (J. McDunnough); No. 2331 in the Canadian National Collection, Ottawa.

Eipogona americana n. sp.

The genus *Eipogona* Rond. (*Eupogona* auct.) has not been previously recorded from North America. The known species have much the facies of *Zenillia cheloniae* but are smaller and wholly pruinose, while the parafacials bear short, bristly hairs; the eyes are short and sparsely hairy, posterior tibiae ciliate, intermediate abdominal segments without discals, etc.

In Coquillett's key (1897), traces to *Admontia* while in Williston's Manual (1908) traces to *Admontia* or *Cryptomeigenia* but the profile of the head is as in *Zenillia.* Length, 6.5 to 7 mm.

Male.—Black, grayish ochreous pollinose, the pleura gray; face and occiput rather silvery white; mesonotal black vittae conspicuous; depression of first segment and apical half of fourth less thickly pollinose.

Front practically as wide as eye, with a row of frontal-like orbitals, ocellars and outer verticals strong, postocellars well developed; a row of short black bristles on either side behind the occipital cilia; frontal vitta dark rusty red, in front hardly three-fourths as wide as parafrontals, forked Y-shaped above where the parafrontals are strongly narrowed; frontal hair black; occipital pile whitish, not abundant. Cheeks about one-seventh eye-height, black haired. Vibrissae level with oral margin, two or three bristles above them; parafacials one-fourth as wide as facial depression with sparse bristly short black hairs, narrowed below Antennae black, reaching the lowest fifth of face, third segment three times as long as second, rather broad, its apex sub-truncate. Arista tapering from near base, rather thick to beyond the middle. In profile the head is only a little shorter below than at antennae.

Acrosticals and dorso-centrals, 3–3; sternopleurals, 4; four pairs of marginal scutellars, the apical pair weaker and decussate, almost horizontal. Propleura bare; infra-squamal spinules absent.

Wings hyaline, slightly yellowish in front on basal third. Third vein with two or three basal bristles; bend of fourth vein rather sharp; apical cell open moderately before apex of wing, posterior crossvein curved outwards, doubly curved, joining the fourth vein at the apical third of its penultimate section. Squamae waxy white, the border tinged with yellow; halteres yellow.

Claws and the luteous pulvilli a little elongate; middle tibiae with a strong median antero-dorsal bristle and a weaker one preceding it.

On the abdomen, in certain lights, there is an indication of a darker median line, while the extreme apex of each segment is darker. From posterior view the broad apex of the abdomen appears shining brown. First segment with a pair of weak marginals; second with a pair of short, robust ones; third and fourth with marginal row, the hair of the last two segments and middle of the second bristly, coarse, erect. The venter appears more brown.

Female.—Two pairs of proclinate orbitals, the secondary frontal row absent except a single bristle in front. Head a little wider, the eyes and front of the same relative widths. Otherwise similar to ♂.

Holotype: ♂, Sioux City, Iowa (C. N. Ainslie); No. 2237 in the Canadian National Collection, Ottawa. *Allotype:* ♀, same data. *Paratypes:* 2 ♀, same data.

Host: Papilio asterias (Lepid.). The host of *E. setifacies* Rondani, the genotype, is also a *Papilio, machaon* L.

This species differs from *setifacies* as follows: there is no distinct black stripe on the abdomen, the parafacials are wider and bear somewhat weaker bristly hairs, the hair of the eyes is not quite as evident, the antennae are longer, etc. The genus is very close to *Hylotomomyia* Tns. and the two may prove to be the same. The differences are: presence of the row of orbitals in the ♂ and absence of true discals on intermediate abdominal segments in *Eipogona.* In *Hylotomomyia buckelli* Curran there is a row of strong, short hairs in the place where the orbitals occur in *E. americana,* indicating the very close relationship of the two.

EULASIONA Townsend.

1. First two antennal segments reddish ...... *catskillensis* West.
   Antennae wholly black 2
2. Third wing vein with several bristles basally 3
   Third vein with a single bristle 4
3. Tibiae deep reddish .... **tibialis** n. sp.
   Legs wholly black .... *neglecta* West.
4. Abdomen shining black with rather narrow, interrupted white pollinose basal segmental fasciae .... *nigra* Curran.
   Abdomen with very broad bases of segments pale pollinose, in some lights mostly pale .... *comstocki* Tns.

Eulasiona tibialis n. sp.

Length, 6.5 mm. *Female.* Head thickly grey pollinose, the front and orbits slightly tinged with dark yellowish; frontal vitta with reddish tinge as wide or wider than parafrontal; front four-fifths as wide as eye; two strong frontals and four weaker ones, the upper pair divergent; ocellars weak. Palpi brownish red; antennae black; arista strongly thickened on basal third.

Thorax black, moderately grey pollinose, the four vittae rather narrow, the lateral one appearing broad in some views. Two pairs of anterior acrosticals; posterior sub-lateral absent; three posterior dorsocentrals and acrosticals; two sternopleurals; scutellum grey pollinose, with three strong marginals, the apical pair decussate; no small apicals.

Legs black; tibiae dark reddish; all the tarsi stout; middle tibiae with one strong and three moderately strong anterodorsal bristles.

Wings conspicuously tinged with grey. Squamae white; halteres brownish red. No infra-squamal spinules.

Abdomen black, the first segment moderately greyish brown pollinose, the others greyish white pollinose, the second with a broad, laterally narrowed, sub-interrupted black apical band, the band on the third segment less than half the width of the segmental length and broadly interrupted, the fourth segment only a little shining apically. First segment with one pair of marginals, the second and third with one pair of median discals, the latter with two additional pairs towards the sides; second with a pair of median marginals and two pairs towards the sides, the third with a complete row of marginals; fourth segment with two transverse rows of discals and a row of marginals.

Holotype: ♀, Aylmer, Que., May 24, 1924 (Curran); No. 2057 in the Canadian National Collection, Ottawa.

The specimen was determined as a new species by Dr. Aldrich. There are several differences between this and the genotype: there are only two anterior acrosticals, the third wing vein bears several bristles basally and the infra-squamal setulae are absent. Possibly it should be placed in a different genus and *E. neglecta* West may also show the same characters.

BELVOSIA.

1. Abdomen yellowish with black median vitta, the first segment and apex of third black, squamae white (P. R.).
luteola Coq.
Abdomen not yellowish on the second and third segments, or if so, without median vitta 2

2. Thorax opaque black in front of the suture, shining black behind; apical two abdominal segments deep orange or brick-red (San Dom.) .... *vanderwulpi* Will.

Mesonotum wholly shining black or more or less grey pruinose 3

3. Abdomen iron-rust yellow, the yellow predominating on first two segments, the iron-rust on third and fourth; first segment brownish beneath scutellum; squamae fuscous (Jamaica) .... *ferruginosa* Tns.

First two abdominal segments black, at most red on the sides, broadly shining behind 4

4. Fourth abdominal segment whitish pruinose, third not as densely pollinose as to conceal the ground color (Brazil, Mexico) .... *leucopyga* Wulp.

Fourth abdominal segment more or less yellow pollinose or if whitish the basal half or more of the third segment is similarly clothed or the pollen does not completely conceal the ground color 5

5. The fourth abdominal segment is densely pollinose and contrasts sharply with the others 6

The third and fourth abdominal segments are densely pollinose or there is no sharp contrast between the third and fourth, the pollen being diffuse and thin posteriorly on both 10

6. Abdomen shining blue-black, the fourth segment yellow (Brazil?) .... *analis* Macq.

Abdomen either dark reddish on the broad sides, the apical segment reddish or the bases of segments two and three distinctly, broadly pollinose 7

7. Abdomen without pollen on first three segments, broadly dull reddish on the sides .... *bella* G.-T.

Abdomen with second and third segments broadly pollinose basally or wholly black 8

8. Abdomen black, the fourth segment reddish (Arg., Mexico?) .... *weyenberghiana* Wulp.

Abdomen with the second and third segments broadly pollinose basally; squamae wholly white 9

9. Pile of parafacials above and of the cheeks very fine, pale yellow .... **antilliana** n. sp.

Pile of parafacials above and of cheeks coarse, black. *unifasciata* Desv.

10. Frontal vitta yellow; sides of face at narrowest part one-third as wide as median depression; bases of three segments yellowish-grey pollinose (Florida) .... *slossonae* Coq.

Frontal vitta normally brownish red to black, the parafacials nearly or quite half as wide as depression; second segment usually without pollen 11

11. First abdominal segment without median marginals; second segment with narrow basal white fascia; squamae of ♀ white or yellowish (U. S., W. I., Br. Guiana). *bicincta* Desv.
First abdominal segment with marginals 12

12. Lower lobe of squamae of ♂ ♀ white; third antennal segment of ♀ three-fifths as long, of ♂ half as long, as third; length 13.5 mm. .... **canadensis** n. sp.
Lower lobe of squamae of both sexes brownish, or if white the third antennal segment of ♀ is at least twice as long as the second and in the ♂ over two and a half times as long. Length over 15 mm. 13

13. Mesonotum, except the humeri, without grey pollen; squamae of both sexes brownish (Man., Sask.) . . . **splendens** n. sp.
Mesonotum conspicuously greyish pollinose 14

14. Lower lobe of squamae of ♀ whitish; only the apical fourth of third abdominal segment blackish (U. S., Miss.,! W. I.!) .... *bifasciata* F.
Squamae dark in both sexes; apical half of third segment black, the whitish yellow fasciae narrowly interrupted (Brazil) .... *esuriens* F.

Belvosia canadensis n. sp.

Related to *B. bifasciata* F. but the lower lobe of the squamae is white in both sexes and the second antennal segment of the ♀ is three-fifths as long as the third. Brownish black or black, basal antennal segments and scutellum brownish red. Apical two abdominal segments densely yellowish pollinose except their tips; face scarcely receding. Length 12.5 to 13.5 mm.

Male.—Front at vertex two-ninths wider than eye, broadened anteriorly, pale reddish brown, thinly pollinose, the frontal vitta narrowest in front of ocelli, scarcely differentiated from the parafrontals in color, nowhere as wide as either parafrontal. Outside the weak frontals are two irregular rows of bristles, only the three lower frontals strong; hair of front fairly abundant. Outer vertical bristles strong, divergent; the occipital cilia extend to the cheeks which bear sparse, fairly fine black hair; occipital pile white, abundant; cheeks hardly half as wide as eye-height; parafacials two-thirds as wide as distance between the vibrissae; vibrissae half the length of second antennal segment above the oral margin; facial ridges with five to seven bristles on lower half to three-fourths and a row of hairs outside them. Palpi broad, gradually widening to their apex which is convexly oblique. Antennae black, the second segment, base of third and most of the arista brownish red; third antennal segment twice as long as second, its sides almost parallel, the apex truncate with sharply rounded corners; penultimate segment of arista about twice as long as wide. Head silvery white pollinose.

Thorax blackish in front, the sides behind and posterior margin reddish brown; rather thickly cinereous pollinose in front, the pollen becoming obsolete behind, the vittae poorly marked. Dorsocentrals 2 or 3–4; sternopleurals 3 or 4; scutellum with four pairs of horizontal marginal bristles.

Legs blackish; pulvilli yellow, rather small.

Wings brownish; squamae white, the upper lobe brownish.

Abdomen blackish, the apical two segments so densely yellowish pollinose as to conceal the ground color except on their apices. First and second segment each with a pair of short marginals, the third and fourth with row of rather short, stout marginals, the third with recumbent hair, the fourth with erect, short, sparse fine hair scattered over almost the whole surface.

Female.—Front slightly wider; brownish; the second antennal segment three-fifths as long as third.

Holotype: ♂, Piapot Reserve, Saskatchewan, July 4, 1908 (Jas. Fletcher); No. 2291 in the Canadian National Collection, Ottawa. *Allotype:* ♀, Calgary, Alta., September 2, 1922. *Paratypes:* ♂, Aweme, Man., June 25, 1919 (N. Criddle); ♂, Calgary, Alta., September 2, 1922; 5 ♀, Douglas Co., Kans., May 13 and 19, 1923 (W. J. Brown); ♀, Payne Co., Oklahoma, April 12, 1925 (W. J. Brown).

Belvosia splendens n. sp.

Blackish or castaneous, the apical two abdominal segments densely yellow pollinose except their apices; squamae brown in both sexes; face rather strongly retreating; related to *bifasciata* F. Length 15 to 17 mm.

Male.—Front a little more than one-fourth wider than either eye, shining black or castaneous, the parafrontals obscurely, transversely rugose on their inner half, the frontal vitta one-third as wide as front, opaque, with slight whitish reflections. Parafrontals with a row of bristles outside the frontals, which are fairly strong, the hair rather long, some of it bristle-like. Head silvery white pollinose. Outer verticals strong; occipital cilia extending to the cheeks which bear rather fine black hair; occipital pile whitish; cheeks three-sevenths as wide as eye-height; parafacials two-thirds as wide as distance between the vibrissae. Facial ridges with 10–12 bristles on lower three-fourths, and sometimes occasional ones outside the row among the sparse, coarse hairs. Palpi reddish, becoming brown basally, robust; antennae black, the incisures and most of the arista brownish red; third segment more than twice as long as the second; penultimate segment of arista twice as long as wide. Vibrissae situated one-third the length of second antennal segment above oral margin.

Thorax shining, only the humeri weakly pollinose. Dorsocentrals 3–4 or 5; sternopleurals 4 or 5; marginal scutellars horizontal, 4 or 5 pairs. Scutellum sometimes obscure reddish apically.

Legs black; pulvilli pale yellow, fairly large; claws bright yellow with black tips.

Wings brown; squamae and halteres brown, the latter reddish basally.

Abdomen black, the apical segments densely pale ochreous pollinose, the apex of the third broadly, of the fourth narrowly, black. First and second segments each with a pair of marginals, the third and fourth with marginal row of strong bristles. Abdominal hair sub-appressed except on the fourth segment where it is fine and sub-erect and does not extend nearly to the base of the segment.

Female.—Head black in ground color; third antennal segment very little more than twice as long as second; penultimate segment of arista one and one-half as long as wide.

Holotype: ♂, Saskatchewan; No. 2292 in the Canadian National Collection, Ottawa. *Allotype:* ♀, Baldur, Man., July 11, 1925 (R. D. Bird). *Paratypes:* ♂, Aweme, Man., 1914 (A. Criddle); ♂, South Arm, Lost Mountain Lake, Sask., June 13, 1920 (C. H. Young); ♀, Aweme, Man., July 9, 1925 (E. Criddle); ♀, Aweme, Man., July 3, 1922 (S. Criddle).

Belvoisia bifasciata F.

Musca bifasciata F., Syst. Ent., 777, 1775.

Thirty specimens from Mississippi, Texas, Pennsylvania, Illinois and Florida are referred to this species. The face is hardly as receding as in *splendens* but much more so than the *canadensis* in which it is scarcely retreating. The squamae are normally brown but in some specimens of both sexes the lower lobe may be almost whitish, in which case it is separable from *canadensis* by its much larger size, receding face, stronger bristles on first abdominal segment and longer third antennal segment.

A NEW DRAGONFLY FROM VIRGINIA.

By William T. Davis, Staten Island, N. Y.

The dragonfly *Neurocordulia obsoleta* Say (*polysticta* Burmeister), is crepuscular in habit, and usually a rare insect. It has been reported from Maine and Massachusetts, as far west as Illinois, and as far south as Louisiana. *Neurocordulia yamaskanensis* Provancher is also recorded as uncommon, and if anything more crepuscular in habit than *obsoleta.* It is recorded from Maine, the Province of Quebec, and also occurs in Ontario, as is stated by Prof. E. M. Walker.

The writer has collected but three specimens of *obsoleta* though others have been examined. They are usually disturbed in some situation where they have been at rest. He has also in his collection a female *Neurocordulia* collected close to the James River in Buckingham County, Virginia, June 21, 1919. It was found in the partly forested country while collecting insects with Col. Wirt Robinson. This specimen has been shown to a number of specialists in Odonata, and compared with all the specimens of *obsoleta* available. It differs in a number of important characters, and is no doubt a representative of a rare and undescribed species of *Neurocordulia,* which like *obsoleta* and *yamaskanensis* is also crepuscular in habit. It was hoped that additional specimens might be collected, but while the writer, through the kindness of Colonel Robinson, has since visited the locality, it has been in August, and possibly too late for the *Neurocordulia.* On July 6, 1919, a very old female *obsoleta* with clouded wings was collected at Wingina, Va., on the opposite side of the James River from Buckingham County.

In *Psyche,* July, 1890, Dr. Hagen gives descriptions and illustrations of both *obsoleta* and *yamaskanensis,* and in Howe's *Manual of the Odonata of New England,* there are also figures of appendages. In *Entomological News,* November, 1908, Plate 18, Mr. E. B. Williamson figures the wings of *yamaskanensis,* as well as those of the allied *Platycordulia xanthosoma* Williamson. While the Virginia specimen resembles *xanthosoma* in some respects, it is a true *Neurocordulia,* having the anal loop separated from the wing margin by one row of cells, and not by two, as in *Platycordulia.* The shape of the anal loop is also the same as in *Neurocordulia.*

Neurocordulia virginiensis n. sp.

Type, female. Buckingham County, Virginia, June 21, 1919. Davis collection.

Of the same size as *obsoleta,* but with the wings not as densely reticulate, and the pterostigma shorter with its front and hind margins not as parallel. No cross-veins in the median (basilar) space behind the arculus, whereas in *obsoleta* there is a cross-vein in this space in both fore and hind wings in all the specimens so far examined. In having no cross-vein in the basilar space, it resembles *yamaskanensis* but it lacks the numerous cross-veins and spaces beyond the pterostigma in both the fore and hind wings present in *yamaskanensis* and *obsoleta. Virginiensis* also lacks the third row of cells below Cu_2 in the fore wings, present in both the other species of the genus. Other differences in venation may be seen by comparing the figure of the female from Cabin John, Maryland, June 10, 1910, with the type.

The abdominal appendages are pale brown, darker at tips, and shaped as in *obsoleta,* but shorter. They are about twice as long as the last segment, whereas in *obsoleta* they are plainly more than twice as long. The vulva notch (see figure) is differently shaped and broader than in either *obsoleta* or *yamaskanensis* as figured both by Hagen and Howe.

The general color of *virginiensis,* taken from the more or less faded type, is yellowish brown, with the front, mouth parts, legs except the tarsi and spines which are black, pale greenish yellow. The membranula are as in *obsoleta,* white at basal half with the apical portion blackish. Both the fore and hind wings are almost devoid of spots, the pale yellow ones showing much more plainly in the photograph than in the specimen itself.

Measurements in millimeters: Female type: Total length with appendages, 49 mm.; width of head across eyes, 8 mm.; length of abdomen, 36 mm.; length of front wing, 34 mm.; length of front tibia, 4.5 mm.; length of hind femur, 6 mm.

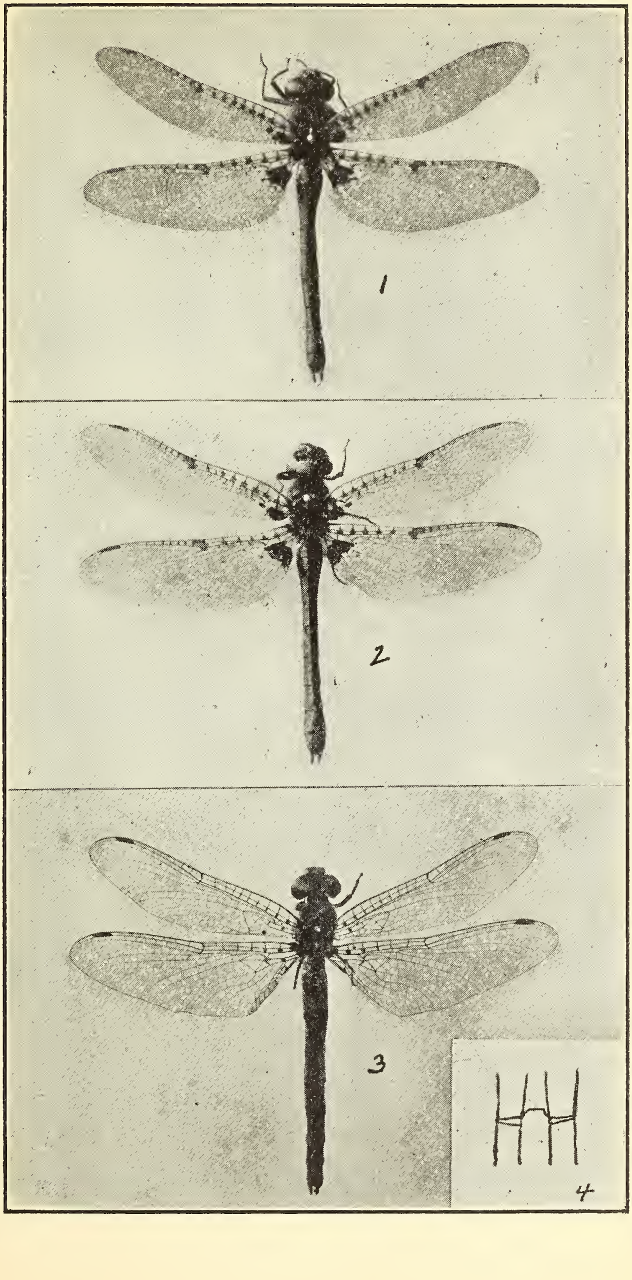
Explanation of Plate X.

Fig. 1. *Neurocordulia obsoleta* Say, Wingina, Va., July, 1919.

Fig. 2. *Neurocordulia obsoleta* Say, Cabin John, Md., June, 1910.

Fig. 3. *Neurocordulia virginiensis* Davis, Type, Buckingham Co., Va.

Fig. 4. *Neurocordulia virginiensis,* vulva opening.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COMMENT ON INSECTS IN OCEAN DRIFT OR TIDE LINE.

By J. R. de la Torre-Bueno, White Plains, N. Y.

I.

Insects on the tide line are frequently mentioned in the literature. There have been six particular references to this phenomenon with special reference to Heteroptera in the last twenty years. This past summer I spent two weeks at East Hampton, on the south shore of Long Island, and made day by day observations on this occurrence from August 4 to August 13. These follow practically as in my field notes.

August 9, 3:30 to 5:00 p. m., Standard Time.—Very little on the tide line, principally Coleoptera and Hymenoptera, but found a few Heteroptera, namely:

Corythucha associata O. & D., one; *Alydus pilosulus* H. S., one; *Podisus maculiventris* Say, one; *Orthoea basalis* Dall, one; *Eremocoris ferus* L., three; and *Pseudocnemodus canadensis* Prov., four, long-winged.

The day was clear and bright, temperature above 75°, wind moderate and on-shore; tide near ebb. This was the first quiet day after a series of days since August 4 of high winds, rough water and heavy surf, on none of which was anything found.

August 10, 4 to 6 p. m., Standard Time.—Again to the same mile-and-a-half stretch of beach between East Hampton and Amagansett. The majority of insects to-day were Coleoptera, although there were quite a few Hymenoptera also. Of the beetles, coccinellids were the most abundant, followed by Longicorns. The Heteroptera at first were not very abundant, but later the outflowing tide line gave goodly numbers. Perfect and imperfect specimens were kept to show the proportion in numbers of species and families. The species secured were: *Stenopoda culiciformis* F., 1; *Eremocoris ferus* L., the most common species, of which 14; *Pseudocnemodus canadensis* Prov. followed next in abundance, 13 being found, all long-winged; *Apateticus bracteatus* Fitch, 1; *A. cynicus* Say, 2, male and female; *Acrosternum hilare* Say, 2, male and female; *A. pennsylvanicum* Deg., 2, male and female; *Euschistus politus* Uhler, 1; *E. variolarius* P. B., 14; *E. euschistoides* Voll., 1; *Podisus maculiventris* Say, 1; *Hymenarcys nervosa* Say, 1; *Corythucha associata* O. & D., 2; *Neur-*

octenus elongatus (Osb.) Blatchley, 1; *Alydus eurinus* Say, 4; *A. pilosulus* F., 1; *Lygaeus kalmii* Stål, 7; *Blissus leucopterus hirtus* Mont., 2, long-winged; *Coenus delius* Say, 2; *Ischnorhynchus geminatus* Say, 1; *Pagasa fusca* Stein, 1, long-winged; *Hypogeocoris piceus* Say, 1, long-winged; *Harmostes reflexulus* Say, 1; *Ligyrocoris diffusus* Uhl., 4.

The day was an ordinary warm summer day; and there did not appear to be any special flight of Insects. The sky was clear, the sun bright, and the wind from the water (on-shore). The ocean was very calm and the breakers small, if any. Most of the insects, except the Coleoptera, were badly water-logged, and many dead and much bedraggled.

August 12, 2 to 3:15 p. m., Standard Time.—The same stretch of beach as on the 10th. The catch was very poor. Very little débris of any kind on the tide-line. The tide was on the turn. The day was more or less clouded, the wind S.E., quartering on-shore. Temperature 76° to 78° F. The majority of the insects found were coccinellids, some fresh and active, others remnants from two (?) days before, picked clean of the soft parts by the many sand-fleas (Orchestia sp.). Only four Heteroptera were found on about 1,000 feet of beach; 1 *Podisus placidus* and 3 *P. maculiventris.* There was a conspicuous absence of the forms abundant on the previous Tuesday (the 10th).

August 13 was a blank day. Noted on the beach, all told, 6 beetles—two coccinellids, one active; one *Doryphora,* very much alive; one *Longicorn,* one small dorbeetle and one small carabid, all dead and dry. The night before, ushered in by a heavy sea-fog after 4 p. m., was very rainy; and this day was more or less cloudy and sultry; the wind about S. to S. E., temperature about 78° F., tide on the turn and beginning to flow. The 14th was another barren day. The net result was 3 long-winged *Pseudocnemodus canadensis.* There were also a few Hymenoptera and more abundant beetles, mainly coccinellids. The day had been warm in the morning with a sudden spat of rain at noon; temperature up to 86° F. and above, quite humid but not so moist as the day before. The wind was about S.W., light; the tide out and slack; very little drift on the shore.

In Psyche (vol. xxxiii, pp. 110–115, for August–October, 1926) Dr. J. G. Myers has an article on " Heteroptera in Ocean Drift," which he starts by saying that: " The presence of occasional terrestrial insects or their remains in beach drift is a phenomenon of little ethological significance," a dictum in which I heartily agree and go further: It is of no significance at all!

Let us consider the data preceding, obtained at the one place and over a period of time when most of the summer bugs are matured and also at a particular time of the day.

August 9.—Bright and clear; temperature above 75°, wind moderate on-shore; tide near ebb. Bugs caught: Species, 6; number, 11.

August 10.—Bright and clear; summer temperature (80°?); wind on-shore; tide ebbing, ocean very calm. Bugs: Species, 24; number, 79.

August 12.—More or less clouded; temperature 76°–78°, wind about S.E., quartering on-shore; tide on the turn. Bugs: Species, 2; number, 4.

August 13.—More or less clouded; temperature 78°, sultry; wind, S.–S.E., quartering on-shore; tide on the turn and beginning to come in. No bugs found, only 6 beetles. The night before was rainy.

The two days of abundant insects on the tide line have this in common: clear and bright; on-shore wind; tide ebbing. The two unfavorable days were cloudy, wind quartering on-shore; and tide on the turn toward flow.

It is obvious, therefore, since insects fly on clear warm days, and go in any direction, that those that fly over water sooner or later will fall in, for whatever reason—exhaustion, lure of the sparkling water, or what not. Now, if the wind is off-shore, that is, blowing away from the land, the insects naturally, since they are on the surface, will be blown out to sea; and, of course, lost to students. But if the wind is on-shore, that is, blowing from the sea to the land, a sea breeze, the drowning insects will be blown toward the shore with the waves, and the tide does the rest. The condition is more favorable at ebb tide, because then the receding waters deposit their floating burden of all kinds on the sands.

It follows, therefore, that Dr. Myers is right, and this phenomenon appears to have no ethological significance, whatever may be its utility to the collector who is enriched by the rare species found on the beach.

II.

The species found, ordered in accordance with Hemiptera of Connecticut, our standard manual for the species of this latitude, are the following: No aquatics, mirids, nor the smaller groups:

Nabidae: *Pagasa fusca* Stein, 1 of the rare macropterous form. Not before noted in the drift.

Reduviidae: *Stenopoda culiciformis* Fab., 1.

Tingitidae: *Corythucha associata* O. & D. Three of this very abundant form on Long Island wild cherry (*Prunus serotina*).

Lygaeidae: *Lygaeus kalmii* Stål, 7 specimens; *Blissus leucopterus hirtus* Mont., long-winged, 2; *Hypogeocoris piceus* Say, 1, of the rare long-winged form not found previously in drift; *Ischnorhynchus geminatus* Say, 1; *Ligyrocoris diffusus* Uhl., 4; *Orthoea basalis* Dallas, 1; *Pseudocnemodus canadensis,* 17; long-winged of this normally apterous form; *Eremocoris ferus* Say, 17 of this common species. These two last are the commonest Lygaeids in drift.

Aradidae: *Neuroctenus elongatus* (Osb.) Blatchley, one of this species, here recorded for the first time from New York, it being known heretofore from Indiana, North Carolina, Ohio, Washington, D. C., and Pennsylvania; first time recorded in drift.

Alydidae: *Alydus eurinus* Say, 4; *A. pilosulus* H. S., 2.

Corizidae: *Harmostes reflexulus* Say, 1.

Pentatomidae: *Euschistus euschistoides* Voll, 1 specimen; *E. politus* Uhler, 1; *E. variolarius* P. B., 14 specimens; *Coenus delius* Say, 2; *Hymenarcis nervosa* Say, 1 only; *Acrosternum pennsylvanicum* Deg., 2, male and female; *A. hilare* Say, 2, male and female; *Apateticus cynicus* Say, 2, male and female; *A. bracteatus* Fitch, 1 male; *Podisus maculiventris* Say, 5 specimens; *P. placidus* Uhler, 1.

The most abundant groups, as might be expected, are the Pentatomidae, 11 species and 32 specimens, and the Lygaeidae, 8 species and 50 specimens. The other 6 families number only 7 species and 13 specimens out of the total of 26 species and 95 specimens found.

This relative abundance of the two families obtains throughout the summer. Of the other groups, some are more abundant at one time than at another. For instance, Dr. Myers comments (p. 113, *op. cit.*) that the Aradids were very abundant in the spring beach material he had. This is as it should be, because in that case, the Aradids appear to fly and be active out of their shelters at about that time of year. Dr. Parshley and I collected abundance of *A. 4-lineatus,* sunning themselves and in flight at Leeds, Mass., on April 6, 1919; and I have taken this species at large occasionally at about that time of year here in White Plains, and

1 *A. niger* on July 19 and 5 *A. uniformis* Heid, and 1 *A. abbas* Bergroth. Obviously, *Aradus* or some of its species, notably 4-*lineatus*, have some sort of spring activity.

The heretofore unnoted species here enumerated bring the total of Heteroptera thus found in beach drift to 98 species.

III.

At this point it may be useful to note all the literature that has come to my notice so far covering this phenomenon as noted in my papers cited and in Dr. Myers's article. Those marked * are cited from other papers and have not been seen by me.

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A correction to No. 2.—Plate VI, Membracidae, should be numbered VIII, the left bottom figure of this plate should be numbered 4.

A NEW KELP FLY FROM LONG ISLAND (FUCELLIA, DIPTERA).

By H. C. Huckett, Riverhead, N. Y.

Kelp flies are numerous along the beaches of the Atlantic coast. They are also to be found along the margins of rivers and lakes, such for instance as Lake George, Lake Ontario and at Lawrence on the Merrimac River. Malloch[1] reports the flies as occurring at Carmi, Illinois, a town on the Little Wabash River. Despite their common occurrence along the seashore only one species has been known to inhabit the coastal strip from Maine to Georgia, namely, *Fucellia maritima* Haliday. Stein[2] lists *rufitibia* as occurring commonly at Pacific Grove . . . and Dungeness, Ga. (Georgia). Enquiries concerning the location of " Dungeness," Ga., have led to no satisfactory information as to its existence, so that it seems highly probable that Stein may have made a slip of the pen in citing the distribution as Dungeness, Ga., instead of Dungeness, Washington.

The apparent rarity of any other species other than *maritima* inhabiting our Atlantic coast provided the incentive to make known at this time the occurrence of a second and apparently unknown fly from Long Island. All of the specimens were collected on the sand amongst the grasses that cover the dunes and bluffs directly bordering the Atlantic Ocean and Long Island Sound, and not on the débris washed up by the sea or on the beaches where kelp flies so frequently abound. Another species, superficially resembling these specimens, namely, *Hylemyia albula* Fall., has also been commonly collected on the sandy wastes around Riverhead.

Fucellia albeola n. sp.

Male. Light grayish. Head grayish with reddish black reflections, which are lightly covered with whitish pruinescence: frontal vitta reddish; parafrontals and occipital regions more densely grayish. Antennae blackish, second

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[1] North American Fauna No. 46, Bureau of Biological Survey, U. S. Department of Agriculture, Washington, D. C. 1923. P. 195.

[2] Archiv für Naturgeschichte, 1920 (1918). LXXXIV. Heft 9, p. 63.

segment obscurely reddish. Palpi brownish, paler proximad: proboscis polished. Thorax densely grayish: mesonotum, viewed from above, with two faint light brown vittae between the postsutural dorsocentral bristles, and traces of brownish infuscation on the posthumeral region. Abdomen light grayish, with no trace of central vitta. Legs and coxae grayish, all femora blackened except at extreme apices: tibiae pale reddish yellow, fore and hind tibiae more or less infuscated throughout the distal half: tarsi with basal segments obscurely reddish, remaining segments infuscated. Wings whitish: third, fourth and fifth longitudinal veins and both cross veins dark brown; auxiliary, first and second longitudinal veins paler, yellowish. Calyptrae white, halteres yellow.

Head in profile somewhat square, the parafacials at base of antennae prominent and slightly protruded, fully as wide as width of third antennal segment: facial margin receding ventrad. Parafrontals with bristles weakly developed on the cephalic half, comprising a single pair of orbital bristles and two or three pairs of parafrontal bristles; caudal half of parafrontals devoid of bristles. Eyes small, spherical. Cheeks broad, bare, equal to about three-quarters height of eye, with a fringe of eight short bristles along ventral margin: occipital area slightly swollen. Antennae, viewed from in front, short and stout, reaching below a level of ventral margin of eye; third antennal segment 1.25 times length of second segment; arista swollen at base, microscopically pubescent. Thorax with very few setulae on mesonotum, devoid of acrostical bristles; prealar bristle absent. Sternopleural bristles, 1 : 2. Abdomen short, scarcely equal to length of thorax, terga subequal in length, marginal bristles but little longer than abdominal setulae. Hypopygium swollen, the genitalia with slender yellowish styles; fifth sternum deeply and squarely notched caudad; processes with a few short bristles which become slightly longer distad; the inner margin with two short bristles apicad. Legs slender, bristles weak and not profuse. Fore tibia with one median posteroventral bristle: mid-femur with no bristles on anteroventral surface: posteroventral surface with three short bristles on proximal half: mid-tibia with one median anterodorsal, one median posterodorsal and two posteroventral bristles. Hind femur with seven short widely spaced bristles along anteroventral surface; with three weak bristles along the proximal third of posteroventral surface: hind tibia with two anteroventral, two anterodorsal and two posterodorsal bristles. Tarsi slender, longer than their tibiae, pulvilli and claws short. Wings with costal thorn prominent, equal in length to r-m cross vein. Length, 4 mm.

Female. Similar in color and structure to male. Parafacials with a conspicuous reddish fascia at base of antennae. Wings with third, fourth and fifth longitudinal veins, and both cross veins more conspicuously brownish, the wing membrane adjoining the veins more or less tinged. Abdomen elongate, longer than thorax, third tergum (second visible) slightly shorter in length than each of remaining terga. Hind femur with four to six short bristles along the anteroventral surface: posteroventral surface bare, with two short bristles on basal third of ventral surface. Length, 5 mm.

Records: 1 male, 5 females, Baiting Hollow, Riverhead, L. I., May 20, 1923; 1 female, Southampton, L. I., June 2, 1926.

Type: In author's collection; paratypes in the collection of the U. S. National Museum.

The species evidently most closely resembles the European species *Fucellia griseola* Fall. both in habitat and structure. The male differs from Stein's[3] redescription of the male of *griseola* in having the tibiae pale reddish yellow and not blackish, the hind femur with three or four short irregularly spaced bristles on distal half of anteroventral surface and not with a series of closely set uniform bristles: the female differs in a similar manner in having the tibiae pale reddish yellow and not blackish, and the palpi are uniformly slender and not broadly expanded apicad.

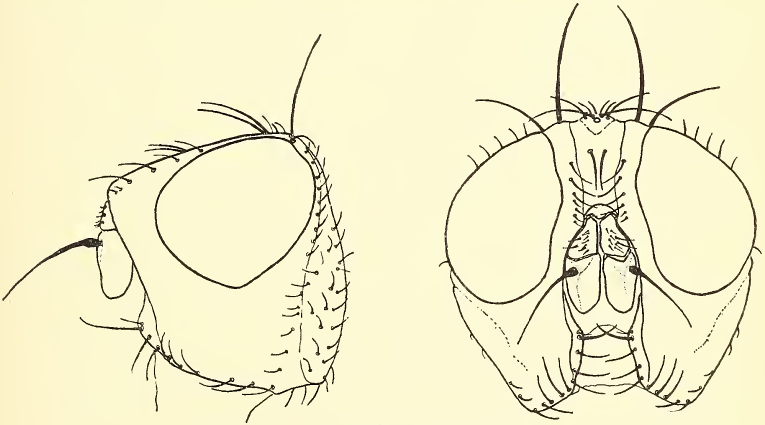

Fig. 1. *Fucellia albeola* n. sp.

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[3] Wiener Entomologische Zeitung, 1910. XXIX. Heft I, p. 23.

PROCEEDINGS OF THE SOCIETY.

Meeting of January 14, 1926.

The Annual Meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum, on Thursday evening, January 14, at 8.30 p. m.

President Davis in the Chair and 9 members present.

Minutes of the previous meeting read and approved.

The Treasurer's Report, as presented by Mr. Engelhardt, showed a satisfactory condition of finances.

Mr. Engelhardt reported that the number of subscribers to the Bulletin approximated 300, and of the amounts that he reported as being due the Society quite a little has been paid, bills having been sent to those in arrears; that the Society has to depend on outside sources for income to meet expenses, and he appealed to the members to try to get new members and subscribers.

Mr. Sheridan, for the Nomination Committee, presented the following list for Officers of the Society for the current year:

For President, Mr. W. T. Davis.

For Vice-President, Mr. J. R. de la Torre-Bueno.

For Recording Secretary, Mr. E. L. Bell.

For Treasurer, Mr. George P. Engelhardt.

For Librarian, Mr. Elmer McDevitt.

For Corresponding Secretary, Mr. Howard Notman.

For Curator, Mr. A. C. Weeks.

For Delegate to Council of N. Y. Academy of Sciences, Mr. G. P. Engelhardt.

For Publication Committee, Mr. J. R. de la Torre-Bueno, Dr. J. Bequaert, Mr. George P. Engelhardt.

As no further nominations were presented, it was regularly moved and seconded that the nominations be closed and the Secretary cast one ballot for the election of those presented, motion duly carried, and ballot cast by the Secretary as directed.

Mr. Doll gave an interesting account of his early activities and collecting experiences after coming to the country in 1864. He especially commented on the very excellent collecting to be found in localities near the city, in the early days.

Mr. Davis spoke of his personal recollections of Mr. A. R. Grote, who at one time lived on Staten Island, of Mr. Grote's early attempts at collecting insects and of the final, large collection made by him which contained over 100 species of *Noctuidae* named by him and which was sold to the British Museum for $5000.00, and also of Mr. Grote's unsuccessful financial ventures.

Mr. Davis also said that he was of the opinion that many insects were more abundant before the English sparrow became so numerous, as they destroyed very many, especially in the larval form. Mr. Weeks was also of the same opinion and related instances which he had observed of their destroying caterpillars.

Mr. Schaeffer spoke of methods of collecting insects and laid emphasis on the necessity of studying the habits of the groups which one wished to collect and concentrating one's efforts on one group at a time, illustrating from his own experiences and those of others the excellent results to be obtained by following this plan. He spoke of sifting in collecting *Coleoptera* and said that this method was not used as much in this country as in the European countries.

Mr. Engelhardt spoke of the large opportunity for original work in the study of life histories and the necessity for specialization to add important facts to scientific knowledge. He cited from his own experiences with the *Aegeriidae.*

This was followed by a general discussion among the members of their experiences of the former days.

Mr. Weeks next spoke of his methods of collecting insects and the appliances used.

Mr. Anderson spoke of finding larvae of insects among vegetables purchased from stores.

Mr. Huntington spoke of Mr. Engelhardt's method of obtaining the larvae of *Feniseca tarquinius,* by placing crumpled newspapers at the base of the bushes and of the larvae and pupae that he had found in these papers.

Mr. Sheridan spoke of his interest in fresh-water insects and of his expectation of getting out of town to do some collecting next summer.

Mr. Davis showed two boxes of insects, principally *Coleoptera,* which he collected in Alabama and Virginia, and told of his method of placing jars baited with molasses and a few drops of fusel oil, alongside of logs and rocks and under projecting rocks; and of the many insects and other things to be obtained by this method; it being necessary some time to prevent skunks and other animals from destroying the jars by placing a heavy stone over them which the animals could not move, but so placed that the insects could get into the jars.

Adjourned at 10.55 p. m.

MEETING OF FEBRUARY 11, 1926.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on February 11, 1926, at 8.30 p. m.

President Davis in the Chair and 12 members and 3 visitors present.

Minutes of the previous meeting were read and approved.

Mr. Engelhardt said that he would present a detailed Treasurer's Report at the next meeting, and that returns were coming in very satisfactorily.

Mr. Torre-Bueno presented the Report of the Publication Committee.

Mr. Davis exhibited a box of insects, containing, among other things, some wasps from Virginia, which he had observed flying down and alighting upon the surface of a pond and drinking therefrom; they rested upon the surface of the pond but a short time, with their legs spread out in a straddling position. (Mr. Davis' remarks were published in full in the BULLETIN, vol. XXI, p. 127.)

Mr. Engelhardt narrated his experiences and observations on an auto trip together with Mr. W. J. Chamberlain, of the Oregon Agricultural College.

Starting at Corvallis, Oregon, on July 8 they passed over the southern part of the Cascade Range by way of Grant's Pass, Medford and Ashland and on the night of July 9 camped along the shore of Tule Lake just across the State line in California. This lake, formerly a famous breeding ground for aquatic birds, has now been drained, but the acid soil proving unfit for agriculture it has become a barren waste. Mosquitoes alone thrive in stagnant ditches. Next followed a fifty-mile drive through the Modoc Forest Reservation, with yellow pine and juniper the principal timber. Then came sage bush country with miserable roads and poor collecting to Susan River Canyon. Numerous short stops were made along the road to Westwood, Lake Almanor, and Feather River Canyon, Mr. Chamberlin collecting many specimens of Buprestidae whenever fresh timber cuttings were encountered. Before reaching

Truckee, California, the car and its contents were subjected to a thorough inspection against Alfalfa Weevil. Along the Truckee River near Lake Tahoe dense swarms of the coccinellid beetles "Hippodamia" were encountered. At Fallen Leaf Lake a two days' camp, July 13–14, offered good collecting in all orders especially above timber line. Continuing leisurely by way of Placerville, Sacramento, Stanford University, Santa Barbara and Los Angeles, and collecting whenever opportunities appeared available, San Diego was reached on July 20.

Mr. Engelhardt's paper was discussed by the members and Mr. Engelhardt pointed out several ways that members who contemplated making a similar trip could profit from his experiences.

Adjourned at 10.30 p. m.

MEETING OF MARCH 11, 1926.

Mr. Sheridan proposed for membership Mr. Carl George Siepmann, 1400 Decatur Street, Brooklyn, N. Y.; Mr. Siepmann being present, it was regularly moved and seconded that the By-Laws be suspended and the Secretary cast one ballot for the election of Mr. Siepmann, which was accordingly done.

Attention was called to the death of Mr. George Alexander Ehrman, of Pittsburgh, Penna., and the obituary notice of his death, in the March issue of *Entomological News.*

Mr. Torre-Bueno called attention to the death of two prominent Hemipterists, Dr. Evald Bergroth, of Finland, and Mr. E. A. Butler, author of "Biology of the Hemiptera-Heteroptera."

Mr. Wm. T. Davis gave an account of his several visits to Cape May Co., N. J., with particular reference to that of August, 1925, when he was accompanied by Mr. John M. Farley, Jr., of White Plains, N. Y. The principal object of the trip was to get better acquainted with the most beautiful Cicada of our coast, namely *Tibicen latifasciata,* that was originally described from Cape May Co. specimens. The insect is generally found most commonly in the thick tangle of hollies, pines, cedars, etc., close to the shore at Town Bank, but 1925 appears to have been an off-year for the species. A few were heard singing their peculiar song, but only one was collected. Many Orthoptera were found and it was again noted, as heretofore in Virginia, that the males of *Tryxalis brevicornis* sometimes make a crackling noise in flight. This species has been reported as being noiseless. The low-lying meadows along Bradner Creek are rich in flowers and insects, and every night the collectors sallied forth with lamps to see what they could find. As usual there were females of the walking-stick insects *Manomera atlantica,* but no males could be discovered. Insects, botanical specimens, and a number of other natural history objects were shown.

Mr. Torre-Bueno said that Mr. Davis is the best all-around naturalist in the State of New York and one of the best in the United States, to whom it is a pleasure to listen and who honors the Society in being its President.

Mr. Schaeffer recorded the capture of several interesting Coleoptera by Carl Geo. Siepmann, a pupil of Bushwick High School, of which he exhibited specimens of the following species. A specimen of *Lebia bivittata* F. captured in the house under a carpet. This is apparently a new record for New York.

At Avenel, N. J., several specimens of *Sphaeridium bipustulatum* F. were taken in company with the more common *scarabaeoides.*

Several specimens of the recently introduced *Brachypterolus pulicarius* from Europe were taken at Evergreen, Long Island, in the flowers of *Linaria,* their natural food plant in Europe.

It is recorded here by Dr. Felt as being either injurious to the flowers of fruit trees or strawberries.

Of *Carpophilus nitens* Fall a number of specimens were taken at Evergreen, Long Island, in October. This species was described from Alabama and is so far the only recorded locality for this species.

Aphodius haemorrhoidalis L., also an introduced European species, was taken in moderate numbers at Avenel, N. J., in August. This species was first recorded from specimens taken by Mr. Fred Winters at the Hackensack Meadows near Secaucus, N. J., and taken later by Mr. F. M. Schott at several places on Long Island. It is apparently well established here.

Adjourned.

MEETING OF APRIL 15, 1926.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum, Eastern Parkway, Brooklyn, N. Y., on Thursday evening, April 15, 1926, at 8.30 p. m. President Davis in the Chair and eleven members and six visitors present.

Mr. Shoemaker reported that Mr. Nicolay and himself were going to make a collecting trip to Cedarhurst on the following

Sunday, and would be glad to meet any members interested in going with them at the Long Island Railroad Station, in time for the 9 a. m. train.

Mr. Davis exhibited a specimen of the usually white Arctian moth *Diacrisia virginica* Fabricius with the borders of the wings suffused with dark scales and the veins black for some distance from the borders of the wings, collected in the Museum at St. George, Staten Island, N. Y., on March 20, 1026. He also exhibited two other normal specimens taken at St. George on April 20, 1926, and a specimen of *Scopalosoma sidae* Guénée, a noctuid moth, taken at Clove Valley on March 7, 1926.

The Rev. Father Joseph Assmuth's paper on "British Indian Termites" followed:

My investigations cover a period of nearly ten years; they came to a close with my deportation back to Europe during the great war in 1916. More than a thousand nests were opened and examined all over India; but the regions most extensively studied are: on the western side of India—Gujerat, Salsette, Mysore and South Canara; on the eastern, Chota Nagpur and parts of Bengal. All these districts abound with termites; most conspicuous among them are the mound-builders.

Termite mounds are nothing but the accumulations of subsoil brought to the surface when constructing under-ground nest chambers. The height of the mound as well as its circumference gradually increase as the colony grows older and more populated. Each species has its characteristic way of constructing mounds. *Odontotermes obesus* builds a sort of vaulted basement 2 to 3 feet high, crowned by a number of pointed pinnacles, the material being solid and greatly hardened through admixture of salivary secretions. *Odontotermes brunneus* mounds show a similar basement but are provided with hemispherical prominences. The entire mantle of the nest is riddled with small holes. The soil of the mantle is of very soft consistency. *Odontotermes wallonensis* constructs large chimneys reaching deep down into the subterranean portions of the nest. *Odontotermes bangalorensis* has a pyramid-like, extremely hard superstructure, broad at the base and tapering at the top with strengthening ridges running up the sides of the mantle. Old nests rise to the height of 8 feet and more.

In the inner nest chambers are the fungus beds. To prepare them the Termites eat dry leaves and bits of wood they find on the ground near the nest. This material passes through the intestine and is then deposited in the form of tiny pellets which are so grouped together that they gradually form a sponge-like mass, soft so long as kept in the nest, hardened when exposed to the air. The fungus beds of strong colonies may be the size of a football or even bigger but as a rule they are much smaller. They show slight differences in structure peculiar to the species of Termites to which they belong.

Mound-builders have nearly always one king and queen in the royal chamber situated in the center of the nest area. In a few nests I found two and three queens, the record number being six queens (in a colony of *Odontotermes bangalorensis*) but in no case did I find more than one king. The age of the queen may be approximately determined by the length and girth of her body, as well as by the alary or pericardian muscles which in older specimens turn quite black. The egg-laying capacity of the queen increases up to the maximum reached at the age of 6 to 8 years, then it gradually diminishes. The exact duration of life has not been determined, but from observations made in the course of years in the same colony I conclude it may reach 12 to 15 years, and perhaps more.

Mound-builders may be annoying in gardens, lawns, etc., but the real damage, often to considerable extent, is done by the wood-destroying termites. The Indian noxious forms belong to the genera *Leucotermes, Odontotermes* (not mound-building types), *Coptotermes* and *Microtermes.* The first of these are the typical house-termites; the second may occasionally attack houses; the third and fourth destroy wood only in the open (railway ties, poles of fences, stacks of beams, etc.).

I have for the first time proved that each species has its characteristic way of feeding on wood and that by the peculiar form the attacked wood shows (feeding figure) the species responsible for the damage may with certainty be determined. No wood seems to be immune against the ravages of the wood-destroyers. So far no thoroughly effective means has been found to impregnate wood so that it might be lastingly protected against Termites.

Besides the mound-builders and wood-destroyers there are many economically quite harmless forms of Termites in India, usually living in small colonies in underground nests, *e.g., Capritermes incola,* the soldiers of which have strangely twisted mandibles; *Eutermes biformis,* a species of the section Nasuti, so-called because the soldiers have, in place of mandibles, their rounded heads provided with a projecting nose-like pointed tube from which a sticky secretion is thrown on the aggressor; and many other forms.

The Rev. Father Assmuth's paper was discussed by Mr. Schoonhoven and some of the other members.

The Rev. Father presented the Society with a reprint of his papers "Indian Wood-destroying White Ants," from the Journal of the Bombay Natural History Society, May 25, 1925, and "Wood-destroying White Ants of the Bombay Presidency," from the same publication, No. 2, Vol. XXII, 1913.

Adjourned at 10.30 p. m.

Meeting of October 15, 1926.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on the evening of October 15, 1926.

The meeting was called to order at 8 p. m. by President Wm. T. Davis, with 10 members and three visitors present.

Minutes of the previous meeting were read and approved.

Mr. Bell, our Secretary, being absent in Washington, D. C., Mr. Sheridan was appointed Recording Secretary, *pro tem.*

Mr. Engelhardt read a report as Treasurer, showing that the financial condition of the Society was excellent, with a balance on hand of $1,124.99. This report was duly ordered placed on file.

Mr. Bueno reported as Editor of the "Bulletin" and "Entomologica Americana" that the first number of the new series of "Entomologica Americana" was out, and had met with excellent and encouraging notices everywhere; that the policy of the Publication Committee would be to encourage authors of original articles on matters of original research to print their works in the new publication; that the number of subscriptions received thus far was most encouraging, and Mr. Bueno stated he had received many letters of congratulation on the appearance and contents of the first number. The outlook was very pleasing.

Mr. Davis remarked that we owe much to the financial backing and interest shown by a friend.

Mr. Torre-Bueno proposed Professor A. L. Melander as a resident member, seconded by Mr. Engelhardt and others.

Mr. Davis announced the sad tidings of the death of Mrs. Annie Trumbull Slosson at the good old age of 89 years, and he made a sympathetic tribute to Mrs. Slosson's many activities in the field of natural history and art. Mr. Bueno moved that a suitable and comprehensive memorial of all that Mrs. Slosson had done for our Society and the study of entomology in general be entered in our minutes. Carried unanimously by a rising vote.

The members then gave some reports of their summer collecting. Mr. Beutenmüller reported finding a beetle *Popillia japonica* Casey on ivy planted on graves in Woodlawn; also reported that the beetle *Popillia japonica* Newm. had been reported from Scarsdale, White Plains, Bronx Park, showing that this pest was now planted in New York localities. Mr. Doll said that he had only a single collecting trip, most unusual for him. Mr. Shoemaker reported that he had a varied and pleasant summer, making many collecting trips, especially in a locality near Canadensis, Pa., where he spent two separate collecting periods in July securing *Limenitis ursula* Fab.; *L. albofasciata* Newcomb; *Melitaea phaeton, Thecla edwardsii, Papilio troilus* Linn.; *Argynnis cybele* Fab.; *A. bellona* Fab.; *Alaria florida, Acronycta radcliffi* Harv., and between September 18 and 27 he secured *Polygonia interrogationis* Fab.; *P. comma* Harris; *P. faunus* Edw.; *P. progne* Cram.; *Eugonia j-album* B. & L.; *Vanessa atalanta* Linn.; *Lycaena pseudargiolus, Papilio troilus* (second brood) and among Noctuids taken by sugaring, *Agrotis badinodis* Grt.; *A. ypsilon, Peridroma saucia, Noctua baja* Fab.; *Feltia subgothica, F. venerabilis, Aletia argillacea, Xylina ferrealis* Grt.; *X. antennata* Walk.; *X. capax* G. & R.; *X. querquera* Grt., and a species of *Xylina* with beautiful grey and black markings he considers new. Mr. Shoemaker reported several other interesting finds of butterflies, moths and many beetles that he had not yet time to mount. He also gave us an interesting and thrilling account of having a browsing buck deer, after swimming up and down a large pond or lake land on the shore only a short distance away from where Mr. Shoemaker was eating lunch and then walk up the bank almost to the very spot, until frightened by a whistle given by Mr. Shoemaker. Altogether a very interesting account.

Mr. Anderson reported some collecting down on week-end trips in upper New York, and showed some fine photos of butterflies and moths, also cicadas just emerging from cases.

Mr. Chapman also had some nearby collecting trips. On one tree he found 17 cases of *Tibicen sayii.*

Mr. Maguire and Mr. Sheridan reported collecting in nearby localities, but Mr. Maguire stated he had been collecting in Bear Mountain region for several years past. Mr. Siepmann collected many beetles in Middlesex Co., N. J. Mr. Torre-Bueno reported that among other trips he had spent some time along the south shore of Long Island near the Hamptons, and would make a detailed report of his finds later on. Also, Mr. Engelhardt stated he would prepare a full account of some interesting finds he made around Coram and Riverhead, L. I. He showed some pitcher plants taken on these trips from which already he had hatched out some specimens to be described later on.

At 10.15 p. m. the meeting adjourned.—John M. Sheridan, Secretary *pro tem.*

Meeting of November 11, 1926.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on November 11, 1926, at 8.20 p. m.

President Davis in the Chair and 12 members and 5 visitors, including Dr. C. T. Brues, present.

The members present unanimously voted the election of Prof. A. L. Melander, of the College of the City of New York, as a member of the Society.

Mr. Engelhardt proposed for membership Dr. G. Lagai, the proposal being held over for action at the next meeting in regular course.

Mr. Torre-Bueno called attention to and remarked briefly on the merits of " Heteroptera of Eastern North America," by W. S. Blatchley; Mr. Davis also offered a few words of praise; Mr. Torre-Bueno showed the members a copy of this book and also one of " Insects of Western North America," by Essig, about which he also made commendatory remarks.

Mr. Anderson showed a box of Lepidoptera among which was a male specimen of *Erebus odora* Linnaeus, taken at Ardsley-on-Hudson, July 31, 1926.

Mr. Weeks showed a specimen of the dragon-fly, *Anax junius* Drury, taken at Yaphank, November 7, 1926, and said that he also found another specimen of the same species at his place in Brooklyn on November 9, these two dates representing a very late occurrence for the species.

Mr. Davis reported that the New York State List of Insects was in course of being printed and that some of the galley proofs were out.

Mr. Schaeffer recorded *Donacia rugosa* Lec. from Riverhead, L. I., several specimens being taken there by Mr. Engelhardt, in

September, the first Long Island record for the species; *Dromius nigriceps* Lec., several specimens taken at Long Beach, L. I., by Mr. F. M. Schott, there being only one other Long Island record for this species; and *Oberea bimaculata* var. *basalis* Lec., from several specimens raised from aster collected at Woodhaven by Mr. Engelhardt, this record being very interesting in view of the fact that the typical form is only known to feed on blackberry.

Mr. Notman showed a dwarf specimen of *Vanessa atalanta* Linnaeus taken on the wing at Keene Valley, N. Y., October 1, 1926, and remarked on the abundance of this species at that place.

Mr. Wm. T. Davis showed a 17-year Cicada and the pupa skin from which it had emerged, collected by Mr. Carol Stryker on Staten Island, June 24, 1926, and stated that he personally had heard a 17-year Cicada singing in the Clove Valley on June 18, and that Mr. Louis Ragot had collected one at Eltingville on June 12. These are probably precursors of Brood II that will appear in vast numbers on Staten Island in 1928.

He also showed two female *Argiope aurantia* spiders that he and Dr. Wm. H. Wiegmann had collected at New Dorp, Staten Island, August 30, 1926. These spiders catch many grasshoppers, but on the occasion mentioned each spider had secured a Cicada (*Tibicen chloromera*). One of the Cicadas was dead when found, but the other was living. It was caught by the wings on one side only. The large insect struggled violently, but was unable to free herself, and evidently would have died in due time of exhaustion. The spider remained at a distance while the Cicada struggled to regain her freedom.

On the topic of " Rambles in the Big Smokies of Tennessee," Mr. Engelhardt related his experiences on a motor trip during August, travelling by way of the Luray Cave, Shenandoah Valley and Natural Bridge, Va., to Gatlinburg, Tenn., where with the guide, Wiley Oakley, known as " the roaming man of the mountains," he spent a week on mountain rambles, including the ascent of Mt. Le Conte, the highest peak of the Big Smokies, elevation 6,600 feet. The luxuriant vegetation, the magnificent virgin forests and the fascinating varied flora on the forest floors were a revelation. Insect life was found of interest, not so much because of unusual species indigenous to the region, but rather because of the fine representation of many species characteristic of the temperate zone in general which here appear to have kept a fair balance as regards abundance and scarcity, while in most districts of denser population this balance has been sadly upset.

Search for specimens of the family Aegeriidae, or clear-winged moths, the speaker's specialty, proved a failure, no doubt on account of the late season. *Argynnis diana* was encountered locally common in the valleys on both the Tennessee and North Carolina side of the mountains. *Cychrus irregularis,* described by Beutenmuller from the Black Mountains of North Carolina, was found on Mt. Le Conte at an elevation of about 5,000 feet. Some of the butterflies and moths were remarkable for their large size. Huge specimens of *Papilio daunus* and *philenor* and the moth *Hypoprepia miniata* with a wing expanse of 1¾ inches compared with its average size of one inch in the East. The return journey was made through North Carolina to Cape Henry, Va., where Mr. H. S. Barber, of the U. S. National Museum, joined the party for a two days' investigation of the interesting sand-dune formations and the cypress swamps between Cape Henry and Lynnhaven. Final stops were made at Cape Charles and along the coastal resorts of New Jersey.

Dr. Brues spoke of his experiences mountain climbing in North Carolina and of driving over the poor roads in Tennessee, presented the greetings of the Cambridge Entomological Club and spoke of its prosperous condition, expressing his happiness over the outlook for the Club and especially its publication. He congratulated the Society on the success of the BULLETIN.

Mr. Davis spoke of his observations, in company with Col. Robinson, at Winginia, Va., in regard to the larger size of the *Papilios* in that locality in comparison with those taken locally, and said that he thought that specimens of this genus from the Southern States were usually of a larger size. In this he corroborated Mr. Engelhardt in his remarks on his trip to the South during the past summer.

Mr. Davis mentioned that through the kindness of Prof. Crosby, of Cornell University, he had received from Mr. Wiley Oakley, of Gatlinburg, Tennessee, the following species of Cicada: *Tibicen linnaei, T. chloromera* and *T. figurata,* all captured this year; the record of *figurata* being the first for the state and adding the fourth state to those in which it is known to occur.

Dr. Melander spoke of the Pacific Coast entomologists and said that they are few and far between, probably only four or five in the whole State of Oregon, though there are more in British Columbia; those in Oregon, Washington, Idaho, Utah, Nevada and British Columbia had at least one meeting a year and sometimes two; he spoke of meetings in Portland and Corvallis, Oregon, and British Columbia. He also spoke of the stations on Vancouver Island, of the good scientific collection and exhibition of insects in the Museum at Victoria, of his personal acquaintances among the entomologists of Washington, Oregon and California, of the unworked material in the collection of the State College of Washington and the good collections in the Oregon Agricultural College as well as several of the California colleges. He commented on the work of Prof. Chas. F. Baker in the Philippines and the book of Mr. Essig shown by Mr. Torre-Bueno as well as his previous book on California insects. He also said that Prof. Jones, of Stanford University, had told him that he had access to a fund of probably $50,000 to cover the cost of publishing a book on the insects of the Pacific Coast, which would probably comprise a series of 5–10 volumes and take some years to complete.

Adjourned 10.07 p. m.

Meeting of December 16, 1926.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum, Thursday evening, December 16, 1926, at 8.25 p. m.

President Davis in the Chair and 10 members present.

The Secretary, on motion duly seconded, was directed to cast one ballot for the election of Dr. G. Lagai as a member of the Society, which was accordingly done.

Mr. Engelhardt proposed for membership Mr. E. B. Chapin, 28 State Street, Hackensack, N. J. As Mr. Chapin was present, it was regularly moved and seconded that the by-laws be suspended and the Secretary cast one ballot for the election of Mr. Chapin as a member of the Society, which was accordingly done.

Mr. Davis appointed as a Nomination Committee: Mr. Sheridan, Mr. Schaeffer and Mr. Schott.

Mr. Siepmann showed specimens of Coleoptera and made the following remarks:

One specimen of *Coccinella* (*Neoharmonia*) *venusta* was taken beneath bark at Rahway, N. J., on August 22, 1925. According to the New Jersey state list only one other specimen of this species has been taken in that state; that in the washup at Atlantic City.

A number of specimens of the newly-introduced nitidulid, *Brachysterolus pulicarius,* were taken during 1926 in the vicinity of Avenel, N. J., mostly in the flowers of its preferred food-plant, *Linaria vulgaris.* It is interesting to note that one specimen was taken by sweeping on July 8, before any of the *Linaria* was in blossom in that vicinity, and another was taken on the flowers of the cultivated hollyhock in company with the American *Conotelus obscurus.*

Mr. Davis showed a card of greeting from Dr. Bequaert, from Monrovia, Liberia; also a copy of Hoffmann's "Entomologen Addressbuch," containing the names of entomologists and collectors from all parts of the world and arranged by countries, alphabetically; he also showed a box of insects and made the following remarks:

Mr. Wm. T. Davis exhibited four wingless, but mature females, of the mantid *Brunneria borealis* Scudder, collected by Miss Louise Knobel at Hope, Arkansas, and stated that he had never seen any males of the species. This insect has a slim body, four inches long, and much resembles a walking-stick insect in form, and is in great contrast to the heavy-bodied *Paratenodera sinensis* Saus., with its broad spreading wings. Of local interest he showed a number of cockroaches, *Periplaneta americana* L., that had been able to survive and perpetuate their kind out-of-doors as far north as Staten Island, by reason of their residence about the fumaroles near Old Place. The railroad fill has been on fire internally for a number of years, though externally it is covered in most places with a multitude of plants. A *Neoconocephalus exiliscanorus* Davis was heard singing for a week or two last August, in a dry field near the Public Museum on Staten Island. Later it was captured on a ragweed. The insect is usually found in swampy ground—it is one of the most moisture-loving of the genus. He also showed the moth *Homoptera lunata* Drury, that he had found on the trunk of a tree, November 2, 1926. This species usually shuns the light of day, often creeping under the edges of logs among dry leaves, and even into the holes made by meadow mice and moles.

Mr. Chapin remarked on the interesting moving-picture "The Gorilla Hunt."

Mr. Torre-Bueno spoke of the "Beach Wash-up Heteroptera from East Hampton, L. I."; he read from his diary notes on his experiences collecting at that place for two weeks during the past summer, enumerating a number of rare species which he found; he expressed the opinion that the finding of insects in wash-up was not of scientific significance, but was controlled by the abundance of the species, the power of flight, atmospheric conditions, the direction of the wind, and the tides. Mr. Bueno's remarks were discussed by the members. (His paper is published in full in this number.)

Mr. Schott and the members discussed the Japanese-beetle situation.

Adjourned at 10 p. m.

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BULLETIN
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Vol. XXII October, 1927 No. 4

THYSANOPTERA—NEW SPECIES AND NOTES.

By Dudley Moulton, San Francisco, Calif.

Family OROTHRIPIDAE Bagnall, 1926.

Erythrothrips arizonae Moulton, 1911.

This species was originally described from specimens taken on orange and olive blossoms at Phoenix, Arizona, and on *Rhamnus purshiana* at Oroville, California.

I have collected many new specimens during the past year and now record the new host plants and localities as follows: *Artemisia californica* (California sage), Willows, San Diego County; *Adenostoma fasciculatum,* Banning, Riverside County, and Mayfield, Santa Clara County; *Mentzelia laevicaulis,* Markleville, Alpine County; White Yarrow, Ebbett's Pass, Calaveras County, California, in May and June, and Mesquite, Phoenix, Arizona, in April.

The third antennal segment of Watson's *E. durango* is clear yellow with a dark cloud near apex and is " elongate wedge-shaped," also the maxillary palpus has seven segments and labial palpus three segments. The species *arizonae* shows a variation in the color of third antennal segment from basal half clear yellow and distal half shading to dark brown, or almost uniformly light brown, or light brown at base shading gradually to darker brown at apex. The sense area of third segment in holotype (female) is elongate (63 m. long), and is almost one-half as long as the segment itself (129 m.). In other specimens before me this sense area is elongate-ovate and only 15 m. long, which shape and size appear to be constant in many specimens.

The maxillary palpus in the holotype is uniformly deep brown in color and has eight distinct segments, while in other new examples before me the large basal segment of the maxillary palpus is deep brown and the distal segments, either six or seven, clear to almost transparent.

The dark longitudinal band along posterior margin of the fore wings may be continuous from the base of the wing including the scale, or the scale may be brown followed by a white area before the dark band, or the base of the wing including scale may be white and the darker band occupy only the three-quarters of the wing.

New material from Arizona before me shows the species as originally described. It may be that varietal differences can be established after a series of specimens have been compared.

Abnormal development of antennae: 6-segmented, with segments six to nine fused or with five to eight fused, or 7-segmented, with six to nine fused and divided into two equal segments.

Orothrips Moulton, 1911.

A large new series of specimens of this genus show clearly that *O. kelloggi* Moulton is a separate species from *yosemitei* Moulton, 1911. I am dividing the genus into two groups based on the shape and position of the sense areas and cones on antennal segments three and four, and am adding three new species.

GROUP I.

Orothrips kelloggi Moulton, 1907, is the largest of the members of the series before me and average specimens measure 2.1–2.4 mm. (original description gave the total body length as 1.80 mm.). Dark cross bands on the wings are distinct and the white areas are almost transparent except for the veins and spines. Third antennal segment usually brown, lighter in basal third or the tip of second and basal third of three may be yellowish. Fore tibiae are strongly colored on dorsal and ventral sides and yellowish or light brown throughout the middle. The sense areas on the third and fourth antennal segments are especially characteristic of this species; these, two in number on each segment, are long, narrow and extend from the tip to near the center of the segment. The new specimens, like the original types, were taken from the blossoms of Madrone and Manzanita in the Santa Cruz Mountains, California, in March and April. Adults appear only for a few weeks during the blossoming period. Larvae also are found within the blossoms and, like the adults, remain on the trees for only a short time. Both adults and larvae feed within the blossoms and do not seem to attack the foliage.

Orothrips keeni n. sp.

This species belongs in the *kelloggi* group which has the elongate sense areas on the third and fourth antennal segments.

Female holotype: Color: Very similar to *kelloggi,* almost uniformly dark brown with orange or reddish hypodermal pigmentation. Antennal segments one and two are deep brown like the body, three light brown in basal third, distal two-thirds of three and segments four to nine uniformly dark brown. Wing bands are less deeply colored than in *kelloggi* and their margins fade into the somewhat grayish lighter areas.

Female holotype: Total body length 1.6 mm.

Sense areas on antennal segments three and four elongate, those on segment three about one-quarter the length of the segment, those on four two-fifths the length of the segment. These sense areas with their long flattened sense plates are distinctly shorter than in *kelloggi.* The eighth antennal segment as in *kelloggi* is shorter than the ninth.

I take pleasure in naming this species after the collector, Mr. F. P. Keen, who found it on *Prunus emarginata* at Klamath Falls, Oregon, in May.

Holotype in author's collection (No. 902).

GROUP II.

Orothrips yosemitei Moulton, 1911.

Female: Color: Dark brown with reddish orange pigmentation. Third segment of antenna is yellowish white in basal half shading to dark brown in distal half. Fore tibiae shaded brown on dorsal and ventral sides and yellowish in the middle, especially in distal half; tarsi yellowish brown to brown. Wing bands are lighter and not so clearly defined as in *kelloggi.*

This species was originally described from specimens taken by the writer in flowers of *Ceanothus* sp. in the Yosemite Valley, California. A new series of specimens have been taken from the flowers of a *Ceanothus* in the hills near Redwood City, California. These specimens show that the oval sense areas of antennal segments three and four with their broad, short sense plates are constant and that the species is clearly distinct from *kelloggi.* The two sense areas of segment three, as is also the smaller one on segment four, are almost equal in size (12 mm. long by 8 mm. wide), while the larger one on segment four is nearly twice as long (21 mm. long by 9 mm. wide). Total body length 1.66 mm.

Orothrips raoi n. sp.

Female holotype, color: Uniformly deep brown except second antennal segment which is lighter at the tip; third segment yellowish white in basal half, outer half dark brown. Fore tibiae yellowish in the middle, fore tarsi yellowish brown. Total body length 1.58 mm.

Very similar to *yosemitei* and yet I cannot assign it to that species. I take pleasure in naming it after the collector, Mr. K. Ananthawamy Rao, who gathered the specimens in Bangalore, India.

Host plant not known.

Holotype in author's collection (No. 1226).

Orothrips variabilis n. sp.

Female holotype, color: Similar to *O. yosemitei* except that the dark bands on the distal part of the fore wings have faded to light gray and are generally diffused into the lighter areas adjoining, while the dark bands in the middle of the wings are distinct but lighter than in *yosemitei.* Third antennal segment is grayish-white in basal half shading to brown in distal portions.

Smaller than *O. yosemitei.* Total body length 1.33 mm. as compared with 1.66 mm. in *yosemitei,* and with antennal segments, especially three, four and five much shorter.

Sense areas on antennal segments three and four are oval as in *yosemitei.*

Specimens collected from cherry blossoms in May, at Vacaville, California.

All types in author's collection.

Comparative Measurements
Antennal segments in microns

	2	3	4	5	6	7	8	9	Total body length
Group I.									
♀ *O. kelloggi* M. . .		123	111	63	45	39	27	33	2.1–2.6 mm.
♀ *O. keeni* M.	45	84	79	51	42	36	21	30	1.6 mm.
Group II.									
♀ *O. yosemitei* M. .	45	96–111	81	60	45	39–42	27	30	1.6–1.9 mm.
♀ *O. raoi* M.	51	105	84	57	45				1.58 mm.
♀ *O. variabilis* M. .	45	84	69	51	42	33	27	27	1.5 mm.

Family AEOLOTHRIPIDAE Haliday

Aeolothrips fulvicollis Bagnall, 1919

Specimens of this thrips collected from blossoms in Kaunli garden, Dehra Dun, India, were sent to me through the courtesy of Mr. J. C. M. Gardner, Systematic Entomologist of the Forest Research Institute, Dehra Dun. (No. 639).

Aeolothrips nasturtii Jones, 1912

I have taken another good specimen from peach foliage at San Jose, California, where the type specimen was found, which should be referred to Jones' species with the following notations: four cross veins or fore wings present but indistinct; longitudinal veins set regularly with spines, those within white areas transparent and difficult to see. Sense area on distal part of third antennal segment elongate and about one-quarter the length of the segment; sense area on segment four elongate and about three-fifths the segment's length; white area on segment five is round and bears a long narrow sense cone.

Aeolothrips hartleyi n. sp.

Female holotype, with the characters of the genus.

Color, uniformly dark brown with bright red pigmentation.

All legs uniformly dark brown. Antennal segments one and two dark brown, three yellowish white, brown at extreme tip, four dark brown gradually shading lighter toward the base, other segments dark brown. Fore wings white at base with a complete dark cross band in second quarter which continues in second fifth as a dark longitudinal band along posterior margin reaching to near tip; hind wings entirely transparent. Total body length 1.33 mm.; female paratype 1.9 mm.

Male allotype: Total body length 1.33 mm. Similar in color to female, also with bright red pigmentation. Clasping organs on the side of the ninth abdominal segment quite similar to those in *fasciatus.*

This species is closely related to *Aeolothrips crassus* Hood and *vittatus* Hal., but separated from both by the dark fourth segment. Antennal segments three and four are light yellowish white in *crassus* and smoky white in *vittatus.* Segment three is four times as long as wide, while in *crassus* it is three times as long as wide; segments four and five are subequal and one-third shorter than three, *crassus* has three and four subequal, *vittatus* has four shorter than three and five shorter than four.

The sense area near the tip of antennal segment three is elongate ovate (6 x 15 m.), of four elongate with rounded ends (8 x 27 m.), with distal two-fifths bent to one side, of five almost round; in the male the sense areas on three are similar to those of the female but slightly smaller, on four broadly ovate (9 x 15 m.), and on five ovate.

Measurements of antennal segments

	1	2	3	4	5	6	7	8	9	Total
♀ Holotype	30 m.	54	108(27)	75	75	15	15	15	12	375 m.
♂ Allotype	30 m.	54	105(27)	75	75	15	15	15	12	375 m.
♀ Paratype	24 m.	45	90(24)	75	72	18	12	12	9	360 m.

Mr. E. A. Hartley gathered these specimens on *Populus tremuloides* in June at Cranberry Lake, N. Y., and I take pleasure in naming the species after him.

Described from two females and one male.

All types in author's collection.

Aeolothrips duvali n. sp.

With the characters of the genus.

Female holotype: General color dark brown to blackish brown including all legs and antennae with the exception of the third segment which shades gradually to lighter brown in basal half. Bright red hypodermal pigmentation throughout thorax and abdomen. Fore wings each with two dark cross bands as in *fasciatus.* Some specimens have the intermediate abdominal segments brown to light brown with reddish orange colored pigmentation; segments nine and ten however are constantly dark brown. Total body length 1.75 mm. Antenna length: segment II, 54 m.; III, 102; IV, 90; V, 66; VI, VII, VIII, and IX, 72; total 384 m.

Sense areas on antennal segments three and four elongate and occupy half the length of the segments, whitened area on five ovate.

Male allotype: Colored as the female except segment two which is lighter brown toward the tip and three which is light brown at the base, gradually shading darker toward the tip. Claspers on ninth abdominal segment similar to those in *fasciatus.* Sense cones on antennal segments similar to those of female. Total body length 1.06 mm. Antenna length: segment II, 45 m.; III, 84; IV, 66; V, 60; VI, VII, VIII, and IX, 60; total 315 m.

This species may be separated from *fasciatus* by the darker third antennal segment and by the absence of triangular plates on fourth and fifth tergites in the male.

Described from fifteen female and four males.

Mr. H. H. Duval collected these specimens at Bastrop, Texas, from the following host plants: *Draba cuneifolia, Bellis integrifolia, Oenothera grandiflora* and *Hartmannia speciosa.* From the variety of host plants it would seem to be a rather common species in this locality.

I take pleasure in naming the species after the collector.

All types in author's collection. (No. 746)

Aeolothrips tuolumnei n. sp.

With the characters of the genus.

Female holotype: General color dark blackish brown including all legs and antennae except tip of segment two which is light brown, three which is light yellowish brown slightly shaded at the extreme tip and four which is brown in basal third and shading gradually to dark brown; other segments dark brown. Fore wings with two cross bands as in *fasciatus.* Total body length 1.50 mm. Antenna length (width) segment I, 18 m.; II, 45; III, 105 (24); IV, 90; V, 60; VI, 36; VII, 21; VIII, 15; IX, 9 m.

Very close to *fasciatus* but separated by the following characters: Last four segments of antennae decreasing in length gradually with six more than twice as long as eight and four times as long as nine, and 6–9 together about one and one-third times as long as five (in *fasciatus* last four segments are almost subequal and together about as long as five); third antennal segment light colored throughout except a slight shading at extreme tip, basal third of four lighter (in *fasciatus* segment three is darker in distal half); transparent area on segment three relatively shorter than in *fasciatus,* area on segment four broadly cone-shaped and occupying about one-fourth the length of the segment.

Two specimens before me are considerably smaller and are light brown but with the two terminal abdominal segments dark brown, with total body length 1.16 mm.

Described from eleven females. Male not known.

Collected by sweeping grass and wild flowers at Tuolumne Meadows, Tuolumne County, California, at an elevation of 9000 to 9500 feet, and named after the type locality.

All types in author's collection (no. 939).

Family FRANKLINOTHRIPIDAE Bagnall, 1926

Franklinothrips vespiformis Crawford has been taken from the foliage of citrus trees at Calexico, Southern California, which extends the distribution of the species. Specimens collected by Mr. E. A. McGregor in October.

Family THRIPIDAE Uzel, 1895

Subfamily Sericothripinae

Genus **Kurtomathrips** nov.

Vertex of head with a deep emargination forming two lobes comparable with *Prosopothrips.* Eyes prominent, protruding.

Antenna with segment two large and globular, three smallest of intermediate segments. Mouth cone long, pointed. Head with prominent semi-reticulate high lines. Bristles of head and thorax thick and curved. Wings wanting. Bristles on abdominal segments one to eight curved, on nine and ten straight.

Type of genus *Kurtomathrips morrilli.*

Kurtomathrips morrilli n. sp. (Fig. 1.)

Female holotype, color: Uniformly light brownish yellow, segments one to five of antenna yellow except basal half of three (not including pedicel) which is light brownish-gray; segments six to eight dark brown; a brown spot on either side of posterior part of prothorax, on either side of mesa- and metathorax and abdominal segments one to eight.

Total body length .66 mm. Head length .066 mm., width across eyes .087 mm., across at cheeks .075 mm.; prothorax length .105 mm., width at anterior end .075 mm., across posterior end .150 mm. Antenna length (width) segment I, 9 m. (18 m.); II, 27 (24); III, 21 (15); IV, 24 (18); V, 30 (18); VI, 33 (15); VII, 9; VIII, 9; total .165 m.

Head (excluding prominent eyes) about as wide as long, vertex deeply emarginate forming two prominent lobes with two distinct though transparent warts on either side, each bearing a strong, transparent curved spine; the inner warts are placed at the tips of the prominent lobes and the outer pair halfway between the lobes and the inner margins of the eyes. Cheeks almost parallel, rough, and with a prominent transparent spine-bearing wart just behind each eye. Eyes prominent, protruding, with coarse facets, not pilose, and occupying more than half the length of the head. Ocelli wanting. Mouth cone long, narrow, pointed, and reaching anterior margin of mesothorax. Maxillary palpi with three and labial palpi with two segments. Antennae more than twice as long as head. First segment is short and broad, two is broadest, subglobular, three is short and smallest of intermediate segments with distinct pedicel, four and five subclavate, five is distinctly longer than four, six sub-ovate. Segment seven only a very little longer than eight. Spines and sense cones transparent and very difficult to determine.

Prothorax about one-third longer than head, with sides expanding gradually to near base where they are abruptly constricted, forming the prominent posterior angles. Each posterior angle bears two stout, curved, transparent spines, the inner one being shorter and difficult to observe. The meso- and metathorax each with two curved spines on either side. Legs unarmed. Wings wanting.

> Abdomen elongate, ovate. Segments one to eight each with two curved spines on either side, one in the middle and one at each posterior angle; bristles on the eighth segment are almost straight, those on the ninth and tenth segments straight. Posterior margin of the metathorax, also of abdominal segment one to eight, serrate.

Described from twelve specimens.

All types in author's collection. (No. 896).

Locality and host plant: Gila Bend, Arizona, on cotton.

I take pleasure in naming this species after the collector, Dr. A. W. Morrill, who has made the following observations:

"The specimens were all collected from cotton plants and I did not find it on any other food plant. I was unable to find any specimens with wings and believe that there were no winged forms present. The individuals which I took to be the adults were wingless. They were very light brown in color with a series of medium brown spots along each side of the body, one to a segment. The nymphs were numerous and considerable damage had been done to about one per cent. of the plants, all of which were more or less stunted and suffering from lack of water. Badly infested and damaged plants were frequently standing beside plants which were apparently free from insects. In fact it was general that injured plants were scattered and the majority of the plants were entirely free from the insects as far as I could determine. All stages fed on both surfaces of the leaves although the under surfaces were slightly preferred to the upper surfaces. It may be that an examination at different times during the day would show that the insects preferred the lower surfaces during the heated portion of the day, when all of my observations were made."

Dr. Morrill adds further: "Further observations made on September 27th and 30th, 1926, each note referring to the condition in a quarter section of 160 acres.

1. 'One area 50 feet diam. has 25% of plants with browned leaves due to thrips mentioned last report. Most of these plants show dwarfing of bolls.'
2. 'Thrips all gone and new growth of 6–8″ on injured plants entirely free from this injury.'
3. 'Thrips injury noticeable on account of stunting (water shortage), 10–15% of plants injured 10%.'
4. 'Thrips work noticeable 15–25% of plants.'

At the time of my September examination I found only a very few specimens of thrips present on the plants and no winged specimens."

Taeniothrips tahoei n. sp. (Fig. 2.)

Male holotype: Color, dark brown, segments two, three and four of abdomen lighter, other abdominal segments shading gradually to darker brown at tip. Legs dark brown, fore tibiae yellowish, shaded on upper and lower sides, middle tibiae yellowish at both ends, hind tibiae yellowish at base, all tarsi yellowish. Antenna dark brown except tip of segment two which is yellowish brown and three which is yellowish brown shaded with light brown or gray in distal third. Wings brown, shading lighter toward base and darker toward tip. Total body length 1.50 mm. Head length .166 mm., width .19 mm.; prothorax length .15 mm., with .25 mm. Antenna length, segment I, 30 m.; II, 44; III, 87; IV, 72; V, 51; VI, 69; VII, 12; VIII, 15; total 375 m.

Head semi-angular in front, eyes protruding, a deep constriction at posterior margin of eyes which causes them to stand out conspicuously. Cheeks slightly arched, with sides diverging posteriorly. Back of head with numerous cross wrinkles. A pair of very long (67 m.) strong, straight interocellar bristles situated between posterior ocelli; a shorter pair on vertex opposite and a little in front of anterior ocellus and close to inner margins of eyes. A series of dorsal lateral spines posterior to eyes. Eyes prominent, facets coarse, pilose. Ocelli large. Antenna long and slender, two and one-thirds times as long as head, segment three longest, basal third unique in shape, enlarging gradually from a rather stout pedicel to about one-quarter the segment's length where there is a broad slight but noticeable constriction, beyond which the segment is again normal. Slender forked trichomes on segments three and four.

Prothorax slightly shorter than head. A conspicuous forward directed spine on each anterior angle (36 m.); spines on posterior angles long and stout, outer 78–81 m., inner 81-90 m., dorsal-lateral spines slightly longer than those on anterior angles, posterio-marginal spines weak except innermost pair. Anterior legs stronger, middle and hind legs slender. Wings fully developed, strong; fore veins with eight (3–5) spines on basal portion, and three (1–2) in distal half, hind vein with 10-14 spines. Abdomen large, as wide as pterothorax, broadly round at tip. Small oval impression on sternites 2–6, 27 x 60 m. on segment four. Comb along posterior margin of segment eight fully developed. Spines on segments nine and ten especially long, 165–171 microns.

Described from one specimen taken from grass at Lake Tahoe, California, in July. This species should be placed in the group with *picipes,* Zett.

Holotype in author's collection. (No. 956).

Taeniothrips pingreei n. sp. (Fig. 3.)

Male holotype: Color: Uniformly dark brown, except tips of segment two and basal half of segment three of antenna which are lighter brown, median portion of fore tibia, extreme base of middle and hind tibia and all tarsi which are lighter brown. Wings gray brown, only a little lighter near base.

Total body length 1.38 mm.; head length .141 mm., width .15 mm.; prothorax length .12 mm., width .183 mm.; pterothorax width .282 mm. Antennae length: segment I, 30 m.; II, 39; III, 66; IV, 60; V, 45; VI, 63; VII, 9; VIII, 12; total length 330 microns.

Head shaped very similar to foregoing species (*tahoei*), but the constriction behind the eyes is less conspicuous, interocellar spines are placed between the posterior ocelli, are shorter (60 m.) and weaker than in the foregoing species; and row of spines behind eyes are also less conspicuous. Eyes are large and prominent; ocelli fully developed. Antenna shorter, about twice as long as head, and segments three to six more compact than in *tahoei.*

Prothorax as in *tahoei* but all spines are weaker and shorter (60 m.). All legs slender; fore pair not so clearly enlarged as in *tahoei.* Wings strong. Fore wings with spines grouped as follows: Holotype, right wing, costa 21, fore vein 7 (3–4) and 3 (1–2); hind vein 10. In male paratypes the grouping at base of fore vein varies, but is constant 3 (1–2) in outer half.

Abdomen with oval impressions on sternites 3–7 much smaller than in *tahoei,* 15 x 39 m. on third segment; tip bluntly rounded. Fully developed comb on posterior margin of segment eight, longest spines on segment nine and ten about 135 m.

Female allotype, color: Uniform deep brown with fore tibiae and all tarsi only slightly lighter; third antennal segment lighter in basal half. Fore wings brown with small oval transparent area near base of wing between and just below intermission in spines on fore vein. Posterior wings light brown with a dark brown median line extending from base to near tip.

Total body length 1.50 mm.; antennae length: segment I, 30 m.; II, 46; III, 84; IV, 75; V, 48; VI, 69; VII, 9; VIII, 12.

General appearance as in male. Interocular spines placed between posterior ocelli (60 m); inner spines on posterior angle of prothorax 90 m., outer ones a little shorter. Fully developed comb along posterior margin of eighth tergite. Long spines on ninth segment 174 m.

This species should also be placed in the group with *picipes* Zett., but is darker in color; third antennal segment is darker and oval impressions on sternites of male are ovate or spherical-ovate while in *picipes* these impressions are elongate and occupy more than one-third the width of the segment.

Described from five males and one female taken from *Solidago decumbens* and *Anaphalis subalpina* in August in Pingree Park, Colorado, by Professor C. P. Gillette.

All types in author's collection. (No. 1038a).

Taeniothrips pearsalli n. sp. (Figs. 4 and 5.)

Male holotype, color: Brown with yellowish orange pigmentation. Third and fourth antennal segments lighter, three lighter than four, six to eight concolorous with one and two. Fore tibiae yellowish, shaded dark brown on upper and lower margins; all tarsi lighter. Wings brown from base including scales, to tip, with longitudinal veins of fore wings clearly darker in color.

Head about one and one-half times as wide as long; front of head between eyes almost straight and cheeks only very slightly arched; back of head faintly cross-striate. The interocellar spines arise on the inner side just above and not between the posterior ocelli; all spines on head weak and inconspicuous. Eyes large, sub-triangular in shape, but neither prominent nor protruding; ocelli large, posterior ones almost contiguous with lower inner angles of eyes. Mouth cone short, triangular; maxillary palpi small with three segments (6–6–9 microns). Antenna about two and one-half times as long as head but nevertheless short and stumpy, segment five very small, semi-vase-shaped and about one-third longer than greatest width at apex.

Prothorax with posterior angles broadly rounded, the two prominent spines transparent, short (30 m.), the two pair of spines inward from these along posterior margin small and inconspicuous. Legs normal. Wings fully developed with setae on fore longitudinal veins of anterior pair as follows: right wing, 1–3, 3–8–1; left wing, 1–3, 11 evenly placed; posterior vein, right wing, 2–4, left wing 1–8.

Abdomen with impressions on sternites 3–7 elongate ovate and small (15 x 45 m. on segment three), without comb on posterior margin of eighth tergite. Segment nine abruptly smaller than eight, long spines on segments nine (90 m.) and ten (84 m.). Segment ten with a dorsal suture for about two-thirds its length.

Female allotype: similar to male in color and general appearance. Slightly larger than male. Total body length 1.3 mm.; head length .096 mm., width .14 mm.; prothorax length .135 mm., width .18 mm.; antennae length: segment I, 12; II, 30; III, 39; IV, 36; V, 30; VI, 42; VII, 9; VIII, 8; total length 216 m.

Abdominal segments eight to ten together triangular in shape, with eight and nine narrowed abruptly and ten drawn out into a sharp point. Comb along posterior margin of segment eight sparse with only about twelve spines; segment ten with a dorsal suture over its entire length.

Described from one male and one female specimen collected by Mr. A. L. Pearsall, after whom the species is named, on aster (*Arnica cordifolia*) at Stillwater, Colorado, at an elevation of 8400 feet.

All types in author's collection. (No. 986.)

Thrips nigropilosus f. *pilosissimus* Pr.

This species was collected from Chrysanthemums in November at the Agricultural Experiment Station, Fort Collins, Colorado, by Dr. C. P. Gillette, and included both the long and short winged forms.

I am indebted to Dr. H. Priesner for the identification of these specimens and his comments as follows: "Very interesting, identical with *T. nigropilosus* f. *pilosissimus* Pr. Austria; *pilosissimus* may perhaps be still another species which I must doubt, based on abundant material already known from Austria. It is possible they are the transition forms between *nigropilosus* and *pilosissimus.*"

This is the first record of this thrips being found in North America. (No. 529.)

Thrips brevipilosa n. sp.

Female holotype, color: Brownish yellow with crescents of ocelli and extreme tip of abdomen orange-yellow. All legs concolorous with body. Antennae: segment one light yellow to transparent; two light brown to brown; three grayish yellow in basal half, shading darker in distal half; four and five grayish yellow in basal one-third, shading darker in distal portions; six and seven dark grayish brown. Wings transparent, yellowish along veins; all spines light yellow to transparent. Total body length 1.38 mm. (paratypes varying 1.25–1.42 mm.); head length .12 mm., width .15 mm.; prothorax length .15 mm., width .20 mm.; pterothorax width .26 mm. Antenna length: segment I, 18 m.; II, 36; III, 54; IV, 45; V, 42; VI, 51; VII, 18; total 264 m.

Forward directed spines on anterior angles of prothorax small, 15 m.; on posterior angles, outer, 18 m., inner 30 m.; four on posterior margin on either side from the outside 15, 15 (15, 21) 21 m. Spines on ninth abdominal segment 75 m.; tenth 75 m. Spines on wing, costa 27; fore vein 4–3–1–2; hind vein 11 to 13. Fore longitudinal vein joins costa just before tip of wing; there are also two distinct cross veins joining costa and fore vein.

Male allotype: Color, as in female, spines on posterior angles of prothorax, outer 15 m.; inner 24 m. Wings as in female. Total body length .92 mm.

This thrips belongs to the group of light-colored species and may be separated from *winnemanae* Hood by the short transparent spines on the posterior angles of the prothorax (*winnemanae* H. has long, nearly black, angular bristles); from *quinciensis* Morgan by its larger size, deeper color, orange rather than red crescents of ocelli; from *nigropilosus* Uzel by its more elongate body, clear body and wing spines, different color of antennae; and from *hearaclei* Moulton, by the different coloration and lighter spines on angles of prothorax.

Described from twenty-four females and one male collected by Professor C. P. Gillette at Fort Collins, Colorado, from blossoms of alfalfa, *Cleome, Artemisia brittonii,* wild mustard, *Peritoma serrulatum,* and golden rod, June to October.

All types in author's collection. (Nos. 1036–1038.)

Bregmatotothrips iridis Watson

Two specimens of this thrips were collected from "Sour Cherry" at Urbana, Illinois, in May by Mr. P. A. Glenn. The examples are almost identical with specimens furnished me by Mr. Watson as collected on Iris in England. Coloration and measurements are almost the same. The prominent spines on the anterior angles of the prothorax are 69 m. long as compared with 45 m. in the Watson material. This is the first record of finding this species in the United States.

Family PHLOEOTHRIPIDAE Uzel

Phloeothrips (Hoplandrothrips) orientalis n. sp.

Male holotype, color: Light brown, body blotched with bright red pigment; fore tibiae light yellowish brown, especially in outer half, and shaded with deep brown along outer margin, fore tarsi light brown; eyes with clear yellow outer borders. Antennal segments one and two deep brown, one lighter in median basal part; three to eight brown with three, four and five lighter at base. Fore wings slightly brownish in the middle and almost transparent at either end.

Total body length 1.92 mm.; head length .32 mm., width .23 mm.; prothorax length .20 mm., width .36 mm.; tube length .166 mm.; fore femora .33 mm. long, .13 mm. wide; middle femora .18 mm. long., .066 mm. wide; hind femora .25 mm. long, .066 mm. wide. Antennae length (width): segment I, 45 m. (39); II, 54–60 (36); III, 96 (45); IV, 84–87 (42); V, 69–72 (36); VI, 60–66 (30); VII, 57 (24); VIII, 36 (15); total length 525 m.

Apex of head sub-conical, produced in front between basal segments of antennae; cheeks abruptly wider behind the eyes, sides almost parallel with a slight neck-like constriction near posterior margin. Postocular spines long, 120 m., with club-shaped tips. Small cheek spines on warts directed forward, those just anterior to neck constriction stouter than the others (21 m.). Eyes with small facets. Ocelli comparatively large, posterior ones opposite and almost contiguous with middle inner margins of eyes. Mouth cone sub-triangular, broad at base, rather sharply narrowed in the middle and drawn out into a pointed tip which reaches the base of mesosternum. Antenna 1.6 times as long as head, segment two clearly constricted neck-like in basal third, three clavate, four and five roundly clavate; sense cones short, stout, three on segment three, four on segment four, two on five, two on six, and one on seven.

Prothorax almost .7 as long as head and one and one-half times as wide as long. Sides strongly arched almost angular with a deep constriction before the base which causes the posterior angle to stand out prominently. Three pair of long spines with swollen tips on either side, those on anterior angles 135 m., mid-laterals 120 m., on posterior angles 90 m., with still another pair on lower angles of prominent coxae 60 m. Pterothorax broadest with sides of metathorax converging gradually to the smaller abdomen. Fore femora greatly enlarged and bearing two small but distinct teeth on the inside near outer end; fore tibiae with a small tooth at base which fits between those on the femora; tarsal tooth large, projecting at a right angle; middle and hind legs slender, middle and hind tarsi each with a small sickle-shaped claw. Wings fully developed, very slightly narrowed in the middle, anterior pair with 11–13 double fringe hairs.

Abdominal segments two to eight gradually reduced; tube comparatively small, posterior angles of segments two to eight each with two long spines having swollen tips, wing-confining spines on segments two to seven, long curved, and pointed. A dorsal pair of long blunt spines on posterior margin of segment nine, posterior angles each with a short stout brown spine (60 m.) and a second long transparent pointed one (150 m.).

Described from one specimen which I have had in my collection for many years and which was taken from a plant in quarantine at San Francisco on a ship arriving from China in October, 1909. The Chinese steward called the host plant "Quasses" and I was unable to get further information except that the plant had been taken aboard the ship at Hongkong, China.

Dr. Priesner, who kindly examined the specimen, comments upon it as follows: "near *russelli* but having fewer double fringe hairs; near *ellisi* Bagnall but posterior head thorns clearer."

Holotype in author's collection. (No. 224.)

Liothrips vaneeckei Priesner.

I obtained many specimens of this thrips which were found on lily bulbs (*Lilium carolinianum*) from North Carolina and intercepted in Portland, Oregon, by Mr. C. Parthington. (No. 624.)

Liothrips montanus Hood.

Specimens taken from Red Currant at Ottawa, Canada, in June by Mr. T. Rankin. This species has heretofore been recorded from currants and gooseberries from Bozeman, Montana. (No. 1012.)

Liothrips brevitubus Karny.

Dr. Karny records this species as found in the leaf galls of *Mallotus repandus* and *Mallotus philepinensis* from Java. I am now extending its distribution to Dehra Dun, India, where it has been taken also on *Mallotus philepinensis* in February, by Mr. M. Bose. (No. 635.)

Rhynchothrips ampelopsidis n. sp.

Female holotype, color: Blackish brown except all tarsi and tips of fore tibiae which are brown, and all antennal segments which are as follows: one dark brown, two dark brown at base and along inner margin, lighter in middle and toward tip, three yellowish brown, four, five and six shading gradually darker; seven and eight brown.

Total body length 1.66 mm.; head length .18 mm., width .20 mm.; prothorax length .21 mm., width .33 mm.; tube length .165 mm. Antennae length: segment I, 27 m.; II, 51; III. 60; IV, 63; V, 60; VI, 54; VII, 48; VIII, 36; total length 390 m.

This species is very close to *R. ilex* Moulton, 1907, but the prothorax is longer in relation to the head, and all tarsi and third antennal segment are brown as compared with yellowish in *ilex*. Postocular and thoracic bristles pointed. Wings fully developed but short, reaching to seventh abdominal segment in holotype, but absent in all other specimens before me. Fore tibiae and tarsi unarmed.

The larvae have a deep red color while the larvae of *ilex* are orange yellow, with a little red in the prothorax and in the seventh and eighth abdominal segments.

Dr. C. P. Gillette collected this species from Virginia Creeper (*Ampelopsis quinquefolia*) in June, at Fort Collins, Colorado.

Described from ten female specimens.

All types in author's collection. (No. 1026.)

Haplothrips shacklefordi n. sp.

Female holotype, color: Dark brown, red pigmentation not conspicuous; fore tibiae brown in basal third shading to clear yellow in distal third, slightly darker along outer margin. All tarsi yellow. Antennal segments one and two dark brown, two lighter toward tip; three to six clear yellow; seven yellow and shaded light grayish brown; eight only a little darker than seven.

Total body length female paratype: Distended 1.9 mm.; head length .20 mm., width .16 mm.; prothorax length .16 mm., width .22 mm.; pterothorax width .25 mm.; tube length .105 mm. Antennae length (width): segment I, 21 (27) m.;

II, 45 (27); III, 45 (24); IV, 51 (30); V, 45 (27); VI, 42 (26); VII, 33 (20); VIII, 24; total length 300 microns. Length of dorsal spines on ninth tergite of female holotype and male allotype:

	Female holotype	*Male allotype*
Middle spines	81– 90 m.	60– 90 m.
Inner angular spines	105–120 m.	39– 45 m. stout
Outer angular spines	100–105 m.	111–120 m.

This species is most closely related to *aculeatus* Fabr. but the head is more elongate and the middle and hind tarsi clearer yellow, while the postocular spines are 30 m. long as compared with 45 m. or longer in *aculeatus.*

The postocular and prothoracic spines are pointed, the seventh and eighth antennal segments are almost yellow and middle and hind tarsi yellow in *shacklefordi,* while in *gowdeyi* Franklin, the terminal antennal segments are deep brown and the postocular and prothoracic spines have dilated tips.

Described from four males and two females. Specimens collected by M. W. Shackleford in the prairie area, Champaign County, Ill.

All types in author's collection. (No. 1654.)

Haplothrips (*phyllophilus*) *subtilissimus* Hal. f. *floricola* Pr.

Taken from under bark of *Sciodopytis verticillata* in San Francisco quarantine aboard ship from Japan, January, 1912. Identified by Dr. Priesner. (No. 544.)

Haplothrips subtilissimus Hal.

Taken from pear buds at North East, Penn., by Fred Johnson in May, 1911. Identified by Dr. Priesner. (No. 545.) This species was also taken from heather aster at Newark, N. J., by Wm. Trager in October, 1926. (No. 1371.)

Leptoliothrips n. gen.

Head almost one-third longer than wide, width of head about equal to length of prothorax. Vertex of head swollen, arising over basal segments of antennae as in *Leptothrips* and bearing the anterior ocellus. Mouth cone long, reaching well past posterior margin of prosternum and sharply pointed as in *Liothrips.* Fore femora greatly enlarged in male, about as long as head and half as wide as long. Tube two-thirds as long as head. Middle and hind legs long and slender, fore tarsi each with a distinct tooth. Wings with parallel sides but not as broad as in *Liothrips,* and not narrowed in the middle as in *Leptothrips.*

This interesting thrips cannot be placed in any of our present known genera. It has the appearance of a *Leptothrips* in the swollen vertex of the head, prominent and rising above the base of the antennae, and in the shape of the antennae, but it departs clearly in the long and sharply pointed mouth cone and in having wings with almost parallel sides and not reduced in the middle. It resembles the genus *Liothrips* in these particulars. It departs from *Liothrips* in the greatly enlarged fore femora (in the male).

Type: *Leptoliothrips manilae* n. sp.

Leptoliothrips manilae n. sp.

Male holotype, color: Uniform deep brown, fore tibiae lighter, shaded dark brown on upper and lower margins, fore tibiae yellowish brown to light brown. Antennal segments one and two concolorous with head, two lighter near tip; two, three and four light yellowish brown, each segment shaded a little in outer half; six to eight brown, six a little lighter near base.

Measurements: Total body length (in normal condition) 1.50 mm.; head length .25 mm., width .18 mm.; prothorax length .16 mm., width (including prominent coxae) .33 mm.; tube length .165 mm., width .060 mm.; fore femora length .255 mm., width .126 mm. Antennae length: segment II, 45 m.; III, 78; IV, 78; V, 69; VI, 54; VII, 48; VIII, 24; total length 396 microns.

Head elongate with cheeks evenly and slightly arched from margin of eyes to posterior angles; entire dorsal surface faintly but distinctly transversely striate. Vertex swollen and produced over the basal joints of antennae. Postocular spines long (63 m.) with dilated tips. Eyes large, with small facets, not protruding. Fore ocellus large, placed at tip of swollen vertex, directed forward. Posterior ocelli contiguous with inner anterior margins of eyes. Ventral side of head continued back to almost one-third the length of the prothorax where the base of the mouth cone arises. Mouth cone long and sharply pointed reaching well past the prosternum. Antennae about one-third longer than head, segments three and four subequal and longest, five, six and seven gradually becoming shorter, with two and seven of about equal length, seven and eight closely united.

Prothorax trapezoidal in shape, with sides almost straight diverging evenly to near posterior margin where the broadly rounded fore coxae form the prominent posterior angles. Metathorax only slightly wider than prothorax including fore coxae. Legs long and slender, fore femora greatly enlarged, fore tibiae unarmed, each fore tarsus with a distinct tooth.

Wings well developed reaching to base of tube, with parallel sides, without veins or coloring, eight to eleven double fringe hairs. Tube two-thirds as long as head, narrowed evenly over distal half.

I am indebted to Mr. George Compare, who collected these specimens in 1909 while traveling and collecting in Manila, Philippine Islands. Host plant unknown.

Described from three male specimens. All types in author's collection. (No. 233.)

Gynaikothrips orchidis n. sp.

Female holotype, color: Quite uniformly dark brown except fore tibiae which are yellowish at extreme base and in outer two-fifths, middle and hind tibiae yellowish at extreme tips, all tarsi yellow. Antennae: segments one and two dark brown, three and four yellow, slightly smoky in outer third, five yellow, light grayish brown in distal third, six yellow at base, grayish brown in distal two-thirds, seven and eight brown. Wings light brown shaded distinctly darker along anterior and posterior margins and with a dark median line fading out in distal portion of wing, abruptly and distinctly whiter back of median dark line giving the effect of a broad white longitudinal line between median and posterior darker lines. Posterior wings transparent with a broad shaded line along posterior margins. Measurements: Total body length (in normal condition) 2.66 mm.; head length .35 mm., width .25 mm.; prothorax length .22 mm., width including prominent coxae, .40 mm.; pterothorax width .48 mm.; tube length .28 m. Antennae length (width): segment I, 24 m.; II, 54 (36); III, 105 (36); IV, 108 (45); V, 105 (39); VI, 96 (36); VII, 75 (27) VIII, 36; total length 540 microns.

Head about one-third longer than greatest width, front of head produced between basal segments of antennae, frons slightly swollen and elevated and having anterior ocellus at tip but not overhanging base of first antennal segments. Cheeks slightly and broadly rounded, back of head constricted broadly neck-like. Eyes with rather small facets, not pilose, not protruding. Ocelli fully developed. Postocular spines, prominent, pointed, .66 m. long. Mouth cone sub-triangular, bluntly pointed, with a large light spot on either side surrounding base of each maxillary palpus. Antennae one and one-half times as long as head, with segments three, four and five elongate, club-shaped, four longest, three and five subequal; sense cones as follows: segment three with one on outer side near tip, none on inner side, four with three large and one small, five with two long and one small, six with two long and one small cone, long sense spine on seven surpassing tip of eight. All large cones long and pointed.

Prothorax, including prominent coxae, one and three-quarters times as wide as long with sides evenly diverging from anterior margin to rounded angles formed by prominent coxae, then sharply constricted to the mesothorax. Anterior angular spines short and directed forwards (30 m. long); anterior marginal spines 60 m. long; mid-laterals 100 m., posterior angle spines longest 150 m., posterior marginal spines 135 m,; all spines pointed. All legs long and slender; fore tibiae and tarsi unarmed. Wings fully developed with fourteen double fringe hairs. All prominent spines on abdomen long and pointed. Tube four-fifths as long as head.

I am again indebted to Mr. Compare, who collected this specimen from orchids in Manila, Philippine Islands, March 3, 1912.

Described from one female specimen.

Holotype in author's collection (No. 546).

Explanation of Pl. XI.

Fig. 1. *Kurtomathrips morrilli* female.
Fig. 2. *Taeniothrips tahoei* male. Tip of abdomen.
Fig. 3. *Taeniothrips pingreei* male. Tip of abdomen.
Fig. 4. *Taeniothrips pearsalli* male. Tip of abdomen.
Fig. 5. *Taeniothrips pearsalli* female. Tip of abdomen.

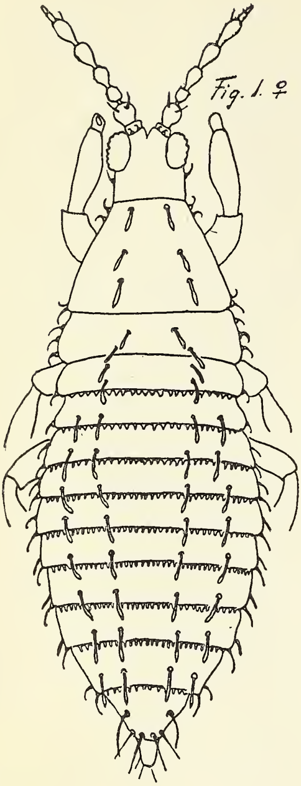

Fig. 1. ♀

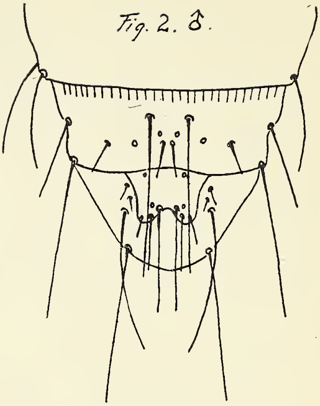

Fig. 2. ♂.

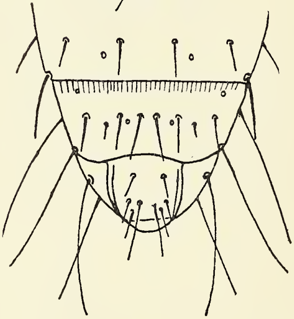

Fig 3. ♂

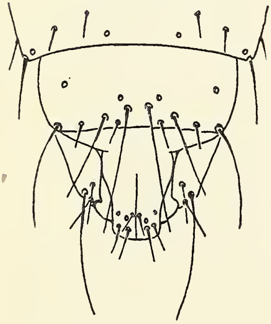

Fig 4. ♂

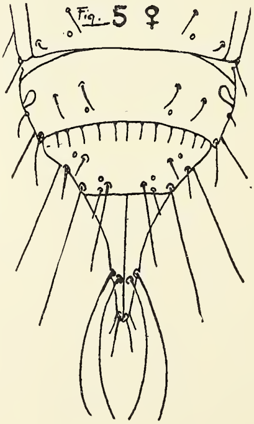

Fig. 5 ♀

DESCRIPTION OF A NEW AMBLYSCIRTES FROM TEXAS (LEPIDOPTERA, RHOPALOCERA, HESPERIIDAE).

By E. L. Bell, Flushing, N. Y.

Amblyscirtes texanae n. sp.

Male. Upperside. Primaries, brown with some yellow-fulvous overscaling toward the base and inner margin; three whitish discal spots, in an oblique row toward the apex, in a nearly straight line with each other, between veins 1–2, 2–3, 3–4; beyond these are two extradiscal dots; three subapical spots; a rounded spot in the cell, at its upper margin about three-quarters of its length from the base; all slightly tinged with yellowish. The stigma is well developed, occupying most of the angle on the cell border between the base of veins 2 and 3, sometimes extending just below vein 2.

Secondaries. Brown with yellowish-brown hairs and scales in the basal and discal areas of the wings, sometimes a few scattered scales of this color toward the outer margin; an indistinct yellowish discal band, representing that of the under surface.

Underside. Primaries. Brown, lighter than above in the cell; along the costal margin, apex and outer margin from the lower edge of the cell to the inner margin is shaded darker, especially toward the base; cell area sometimes with a few yellowish-brown scales; spots of the upperside repeated.

Secondaries. Ground color pale brown, evenly suffused with sordid white scales; a curved discal band of five whitish spots, two above the cell and one below it toward the base.

Fringes of both wings checkered. Body, above brown; beneath grayish; palpi, whitish, intermixed with a few dark hairs; antennae, blackish, ringed with white; club, black above, beneath whitish, except the tip, which is dark.

Expanse: male, 30 mm.; female 31 mm.; approximately.

The females are similar to the males but with reduced maculation.

Described from 24 specimens collected by Mr. O. C. Poling, in the vicinity of Alpine, Brewster County, Texas, during April, May, June, and July, 1926.

Holotype male and allotype female in collection of the American Museum of Natural History, N. Y. City; one male paratype in the collection of the National Museum, Washington, D. C.;

seven male and one female paratypes in the collection of Dr. William Barnes, Decatur, Illinois; one male paratype in the collection of Dr. A. W. Lindsey, Granville, Ohio; one male paratype in the collection of Mr. R. A. Leussler, Omaha, Nebraska; nine male and two female paratypes in the author's collection.

Mr. Poling also sent to the writer several specimens of *Amblyscirtes aenus* Edwards, collected at the same locality in July. To this species and *cassus* Edwards *texanae* bears the most resemblance; it may be distinguished from *aenus,* on the upperside, by the reduced overscaling of fulvus and the lighter shade thereof; in the three discal spots of the primaries being in a more nearly straight line with each other. On the underside, the cell area is brownish, or with but a few scales of yellowish-brown; in *aenus* this area is scaled with reddish-fulvus. On the underside by the light brown ground color, overscaled with sordid white scales; in *aenus* the ground color is much darker and the overscaling is more purely white. *Texanae* has a more prominent stigma than *aenus.*

The stigma and alignment of the three discal spots of the primaries resemble that of *cassus;* but *texanae* differs from that species by the maculation being only tinged with yellowish and not distinctly fulvus; by the less suffusion of fulvus overscaling of the uppersurface of both wings; by the rounded cell spot of the primaries, on the upper edge of the cell, in all of the specimens of *cassus,* before the writer, there are two cell spots, sometimes connected, occupying the entire width of the cell and in all of the males, the lower spot is elongated toward the base of the cell. On the undersurface by the brown discal area of the primaries, which is bright fulvus in *cassus*; on the secondaries, by the even suffusion of sordid white scales, sometimes almost obliterating the discal band of spots; in the pale brown ground color; in *cassus* the ground color is dark; the overscaling more purely white and unevenly distributed, and the discal band and basal spots are much larger and more prominent; also in *cassus* there is, between vein 1 and the narrow stripe of white overscaling along the inner margin, a suffusion of fulvus scales which does not occur in *texanae.*

A NEW SPECIES OF PARASITIC HYMENOPTERA (CHALCIDOIDEA, EUPELMIDAE).

By Raymond L. Taylor, Bussey Institution, Harvard University.

The following species of Hymenoptera was reared by the writer from terminal shoots of white pine which had been weeviled by *Pissodes strobi.* Since the type has been compared with the descriptions of possible American Eupelmids[1] without result, and because the breeding source is novel, the writer ventures to describe this species as new. Types at present are at the Bussey Institution, Forest Hills, Boston, Mass.

Eupelmus pini n. sp.

Length 3.8 mm.

Head: Transverse, somewhat wider than the thorax; vertex, face and cheeks, except front, pubescent, metallic green to purplish, purple between scapes and eyes; labrum dark, pubescent; the area of the eyes darkened more or less by irregular, dark purplish-brown patches, elsewhere light gray, not pubescent; antennal scapes not flattened but round, fitting rather snugly in scrobes, slightly curved, metallic green to blue ventrad; pedicel metallic green; no ring joints visible; funicle eight-jointed, dull black with slight iridescence, very finely pubescent, basal four joints, except first, longer and much less distinctly articulated than apical four, which are capable of greater flexibility; club composed of three segments fused, black but appears lighter than funicle because of thicker and longer light-colored down. *Thorax:* Prothorax short, much narrowed anteriorly, purple with narrow median white band present on the anterior half, finely pubescent; variable in color, from brassy to bright bluish green and pur-

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[1] *Viz.: Eupelmus allynii* French, *E. auratus* Ash., *E. biguttus* Gir., *E. brevicauda* Gahan, *E. charitopoides* Gir., *E. cleri* Ash., *E. coccidis* Gir., *E. conigerae* Ash., *E. cyaniceps* Ash., *E. cyaniceps amicus* Gir., *E. cyaniceps Utahensis* Gir., *E. cynipidis* Ash., *E. dryophantae* Ash., *E. dryorhizoxeni* Ash., *E. epicaste* Walker, *E. floridanus* How., *E. fonteia* Walker, *E. gemmarii* Ash., *E. hirtus* Ash., *E. inyoensis* Gir., *E. juglandis* Ash., *E. lamachus* Walker, *E. limneriae* How., *E. mantis* Ash., *E. marylandicus* Gir., *E. momphae* Gahan, *E. quercus* Ash., *E. reduvii* How., *E. rosae* Ash., *E. speciosus* Gir., *E. sphaericephalus* Ash., *E. zeli* Ash.

ple with iridescence; rugulose, pubescent at sides; pleurae unicolorous with mesoscutum in general, mesoepisternum rugose medially to coarsely reticulate posteriorly and finely reticulate anteriorly, not pubescent; sternum greenish to metallic blue, rugulose, with white pubescence; axillae well separated, elongate, triangular scutellum much narrowed anteriorly, rounded posteriorly, both the axillae and scutellum brassy with greenish tinge, not pubescent. Wings hyaline except for irregular light brown area near apex and below termination of veins, iridescent, punctate uniformly, except near tegulae and on a rectangular area anteriorly near the middle; with short brown hairs similar to the fine marginal fringe, except near tegulae where the hairs are larger; nervures light brown, pubescent. All coxae greenish to blue with metallic reflections, pubescence of fine, rather long white hair; hind and middle trochanters similar, sparsely pubescent, lighter than coxae to unicolorous; fore trochanters darker than coxae. Fore femora stout, curved, with center of arc anterior, flattened on inside; dark greenish-purple, almost black, with white pubescence. Front tibiae yellowish light brown with black areas anteriorly and posteriorly parallel to the long axis; tarsi with first and second joints light yellowish brown, others progressively darker, last joints and ungues black, finely pubescent. Middle femora and tibiae at base light brown, pubescent, apex of tibiae lighter and yellowish; tarsi same as fore tarsi except first joints whitish. Hind femora dark, same as fore femora, except yellowish light brown apically; tibiae same as front tibiae basally but yellowish apically; tarsi same as middle tarsi. *Abdomen:* Dorsum of anterior abdominal segment (just caudad of propodeum) bright blue-green on the anterior half, metallic reddish purple in the posterior half; polished throughout; not pubescent; dorsum of remaining abdominal segments, except posterior one, metallic reddish purple merging into greenish coppery and brassy caudad; rugose, sparsely pubescent with long dark hairs; dorsum of posterior abdominal segment dark purple merging gradually into greenish coppery at apex; rugulose, sparsely pubescent with long dark hairs; all of pleurae dark reddish purple with metallic reflections merging into greenish coppery caudad. Pleurae rugose in upper third; sparsely pubescent with long hairs lighter than those of dorsum; medially rugulose to polished, not pubescent; on lower third polished to rugulose, more strongly pubescent than the upper third; posterior quarter of the sternum greenish purple to brassy, iridescent, rugose, with many long dark hairs. Ovipositor sheaths .9 mm. long, their extreme bases black, beyond straw yellow, merging gradually into dark brown at distal third; ovipositor yellowish brown to darker distally.

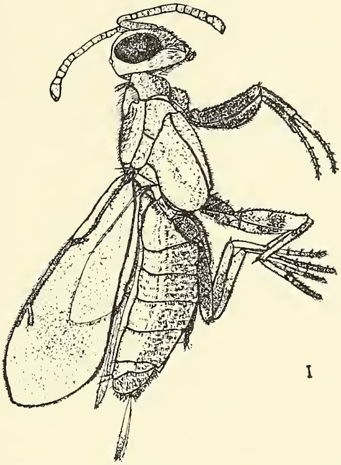

Fig. 1.—*Eupelmus pini* n. sp.

This species resembles *E. brevicauda* Gahan but differs in the following: About .3 mm. longer; head transverse, slightly wider than the thorax; antennal scapes not flattened on side next to eyes; scutellum not unicolorous with mesoscutum; wings not very slightly uniformly fuliginous; first joint of fore tarsi not whitish; ovipositor not slightly exserted.

Described from five female cotypes reared from cocoons in the larval chambers of the white pine weevil, *Pissodes strobi* Peck, in the terminal shoots of white pine, taken October, 1926, at Roslindale, Boston, Mass. It is not known as yet whether this species is a primary parasite of the white pine weevil or a secondary parasite.

NEW LAMPYRIDAE.

By H. C. Fall, Tyngsboro, Mass.

Having had occasion recently to make some determinations among our luminous Lampyrids, I was somewhat surprised to find that one of our commonest New England fireflies, or "lightning bugs" as they are usually called in the vernacular, appears to be without a name. This insect is briefly characterized below, and opportunity is taken to present descriptions of several other new species of *Photinus* and *Photuris* in my collection.

Photinus ignitus n. sp.

> Very similar to *consanguineus,* and with this or with *ardens* it is generally mixed in collections. The form is more elongate than in the true *consanguineus* and with more narrowly explanate elytral margins. The color of the thorax is the same, but the elytra are generally of a paler fuscous tint, rarely if ever as dark as in fully colored *consanguineus.* The color of the ventral segments is substantially as described of typical *consanguineus.* The length in the series at hand varies from 6.8 to 9.5 mm.

The type is a male from Tyngsboro, Mass., and bears date 7–10–'98.

This is a common New England species, and I have seen specimens taken by Mr. Sherman at Peekskill, N. Y., and by Mr. Liebeck at or near Philadelphia. How much farther south it ranges I do not know.

Consanguineus was described in 1851, and the only locality given by Le Conte at that time was "Southern States." The specimen now on the name label in the Le Conte collection is one of a series of five from "W. Va.," and is probably not the original type. It, however, fits his original description and his later (1881) tabular diagnosis, and is probably identical with his original specimens. The original types of *vittigera* (3 exs. from Georgia) are present in the Le Conte series, and appear to have been correctly united with *consanguineus* by Le Conte in his later paper.

P. ardens, described from Lake Superior, agrees nearly with *ignitus* in its narrow form, but in it the disk of the thorax is occupied by a large dusky cloud, not at all or but faintly enlivened with the bright roseate spots so conspicuous in *ignitus* and *consanguineus.*

Photinus ablucens n. sp.

Rather broadly oblong elongate. Eyes small, scarcely larger in the male, separated on the front by about the combined length of the third and fourth antennal joints. Prothorax of the usual form, without subapical sinuations, hind angles not prominent, base broadly feebly emarginate; margins testaceous, a broad parallel entire fuscous stripe occupying rather more than the middle third, on either side an elongate orange red or yellow stripe terminated at base by a fuscous spot; the convex disk very finely punctate and neither carinate nor sulcate. Elytra dark fuscous with narrow sutural and broader lateral pale margins. Body beneath and legs entirely fuscous; light organs completely lacking in both sexes. Length 6.3 to 7.3 mm.

Described from 3 examples (2 ♂, 1 ♀) collected at Algonquin, Illinois, and sent me by Dr. Nason. The type is a male and bears date June, '08.

Except for the absence of light organs this interesting insect is in all respects of structure and appearance a typical Photinus, and rather closely resembles *ardens* in color. In all our other known species of the genus light organs are present except, according to Le Conte, in the female of *demissus*. There is perhaps a possible connection between the absence of light organs and the relatively small eyes, though in *demissus* the eyes are very large in the male.

Photinus granulatus n. sp.

Elongate, parallel; thorax obtusely rounded in front, sides subparallel behind, scarcely sinuate before the apex. Eyes (♂) large, narrowly separated beneath, more widely so on the front; antennae rather short. Pronotum tawny yellow, explanate margin a little paler, disk with a triangular fuscous spot which is broader anteriorly; margin coarsely punctate as usual, convex disk strongly granulose, median line impressed. Elytra dark fuscous, external margins and suture narrowly yellow; legs entirely yellow; fifth and following ventral segments of the male entirely yellow, stigma like pores very large and deep. Length 6 mm.

Lawrence, Kansas; 2 males.

This species has the rather short antennae and large eyes of *dimissus* and *collustrans*, with which it must be associated. The granulate pronotum is a unique character in our species; each granule bears a fine puncture at its summit.

Photinus stellaris n. sp.

Form narrow, parallel; eyes moderately large; antennae black. Prothorax very little wider than long, sides slightly to scarcely arcuate and parallel in about basal half, rather strongly rounded in front; flattened margin dull yellow, closely strongly punctate as usual; convex disk sparsely finely punctate and longitudinally impressed, varying in color from orange red to bright red, or more rarely slightly rosy, and entirely without darker spot, the coarsely punctured apical margin with an ill-defined transverse dusky spot which is sometimes longitudinally divided. Elytra entirely black without pale border, lateral margin very narrowly reflexed, surface subgranulato-rugulose as usual. Legs fuscous, the front and middle thighs paler; ventral segments 5–8 (♂) entirely yellow. Length 6.5 to 9 mm.

Described from a series of nine examples, all ♂, collected by Mr. O. C. Poling at Alpine, Texas.

This species is thus far unique in its unicolored elytra, all others having the sutural and lateral margins paler.

Photinus floridanus n. sp.

Closely related in form and color type to *marginellus,* of which it may be a southern race. The size is smaller than in *marginellus,* the color darker, pronotal fuscous stripe always entire, eyes of male smaller, the width of the front not much less than the vertical diameter of the eye. The third ventral of the male is often in part pale; the sixth in great part, and the seventh entirely, dark in the female. Length 5½ to 6½ mm.

In *marginellus* the pronotal fuscous vitta is usually abbreviated and often entirely lacking; the eyes in the male are larger, the width of the front much less than the vertical diameter of the eye; third ventral of male entirely dark, sixth and seventh ventrals of female typically pale, or as originally described by Le Conte, the abdomen in the female differs from the male only by the last abdominal segment.

Described from a series of eight examples collected by the writer at St. Petersburg and Dunedin, Florida. The type is a male from St. Petersburg and bears date IV–9–'23.

Photuris flavicollis n. sp.

Of the same form as the other known species of the genus. Prothorax orange yellow, the explanate margins paler yellow;

head, scutellum, metasternum and femora yellow; antennae, elytra, tibiae and tarsi black. Margin of labrum triangulate; head broadly concave. Thorax moderately coarsely and densely punctate, the margins more finely so. Elytra entirely black, distinctly closely punctate, nearly as in *frontalis.* Fourth ventral segment posteriorly, and following segments entirely, yellow. Length 8.4 to 11.5 mm.

Alpine, Texas; three males, collected by O. C. Poling.

Flavicollis is of about the same size as *frontalis*; the thoracic punctuation is less coarse and less dense than in the latter but coarser than in *pennsylvanica.* The elytral pubescence is almost black, much darker than in the other species. The entirely black elytra are unique among our representatives of the genus.

NOTE ON THE VARIETIES OF CRIOCERIS ASPARAGI L.

By Melville H. Hatch, Seattle, Wash.[1]

The attention of students of the Nearctic Coleoptera is directed to a paper by Maurice Pic, " Sur *Crioceris asparagi* L. et ses variétés " (Bull. Soc. Ent. Fr., 1906, pp. 119–123) in which twelve common European color forms of our common asparagus beetles are diagnosed. Figures illustrative of most of these forms are given by Heyden (Wien. Ent. Zeit., XXV, 1906, pp. 123–126) and by Kuhnt (Ill. Best.-Tab. Käf. Deut., 1913, p. 818, fig. 81). Further information concerning their biology is given by Schuster (Wien. Ent. Zeit., XXVI, 1907, pp. 111–115) and bibliography is given in the *Coleopterorum Catalogus,* part 51, 1913, pp. 41–44.

In my material from southern Michigan I recognize, in addition to the typical form, the following: *incrucifer* Pic, *quadripunctata* Schust., *linnei* Pic, *anticeconjuncta* Pic, *apiceconjuncta* Pic, *impupiliata* Pic (= *schusteri* Heyd.). The pronotum may be either entirely red, or marked with a double discal spot. However, my only specimens with immaculate pronotum belong to *linnei,* and some, even of that form, have the pronotum maculate.

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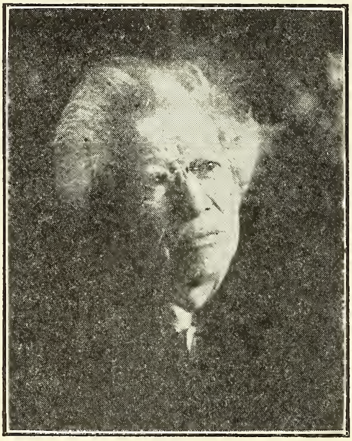
[1] Contribution from the Department of Zoölogy of the University of Minnesota.

A COLLECTION OF INFLATED CATERPILLARS.

By Geo. P. Engelhardt, Brooklyn Museum.



The Program for the meeting of the Brooklyn Entomological Society on the evening of May 12, 1927, included the exhibition of a collection of inflated caterpillars comprising about 1500 specimens of one hundred or more species of butterflies and moths, mostly from Long Island, N. Y.

This collection has been acquired by the Brooklyn Museum through purchase. It was prepared by the late Josef Mattes, a collector of Lepidoptera whose name has often been mentioned in connection with rare and unusual captures, but who himself has contributed little if anything to entomological literature.

Born at Gieshuebel near Carlsbad, Bohemia, in 1836, Mr. Mattes lived at Blankenhain, Thuringia, Germany, until 1885, when he came to the United States, settling in Indiana until 1898; and in Brooklyn, N. Y., until his death in 1921. An artist by profession, he always took a keen interest in entomology and all his spare time he spent in the field collecting. A large collection of North American Lepidoptera, still in the possession of his son, Max Mattes, of Brooklyn, testifies to his skill and care as a preparator and this skill is especially marked in his process of inflating caterpillars.

He not only succeeded in retaining natural forms and positions in his specimens but the original color also has been preserved to a remarkable degree, even to this day. The Museum is to be congratulated for acquiring so unusually fine a collection.

A selection of specimens labelled "The Josef Mattes Collection" will be placed on public exhibition.

ON A FEW NEW AND KNOWN MELOLONTHINE SCARABAEIDAE (COL.).

By Chas. Schaeffer, Brooklyn Museum, Brooklyn, New York.

Gronocarus n. gen.

Body above glabrous, shining. Head convex, separated from the clypeus by an arcuate suture; clypeus concave, rather strongly reflexed in front in the male, less strongly in the female. Antennae 9-jointed, the last three joints forming a moderately large lamellate club, which is longer than the funicle in the male and much shorter in the female. Labrum moderate, slightly rounded at apex. Mandibles triangular, subacute at apex. Ligula connate with the mentum, which latter is scarcely impressed at middle. Maxillary palpi moderately elongate, second and fourth joints elongate, fourth joint subparallel, third joint much shorter than the second or fourth. Labial palpi very short, last joint oval with apex subacute. Anterior coxae transverse, but rather prominent internally. Middle coxae narrowly separated, not prominent. Posterior coxae transverse, narrowly separated, not prominent. Anterior tibiae bidentate in both sexes. Middle and hind tibiae moderately stout, slightly dilated towards apex, the latter with two approximate free spurs. Middle and hind tarsi slender and longer than the tibiae in the male, hind tarsi of female shorter than the tibiae; claws simple, equal, slender and not toothed nor cleft, onychium and paronychia distinct. Ventral segments of abdomen six, not connate; spiracles of the fifth and sixth abdominal segments in the dorsal portion of the ventral segments, the seventh spiracle placed on the suture between the closely connate fifth ventral and propygidium the suture obliterated behind the spiracle.

Genotype, *Gronocarus autumnalis* new species.

Gronocarus autumnalis n. sp.

Males: Moderately elongate, shining, color brown, head more or less black, legs and antennae paler. Head convex behind, sparsely irregularly and moderately coarsely punctate; clypeal suture arcuate moderately deeply impressed from eye to eye; clypeus concave, sparsely and irregularly punctate as the head; margin broadly reflexed, arcuate, entire, not emarginate, the reflexed margin below coarsely punctate and with moderately long yellowish hairs behind but anteriorly smooth, eyes rather large and prominent and moderately coarsely faceted. Antennae 9-jointed, second joint subglobose, third and fourth joints nearly equal, subparallel but short, fifth shorter, subtriangular, sixth short, strongly transverse and acutely produced internally, seventh to tenth joints, forming a three jointed club which is longer than the funicle and opaque not shining. Prothorax about twice as wide at base than long, sides from base gradually but very feebly narrowing to about basal two thirds thence more strongly towards apex; basal angles broadly rounded; anterior angles obtuse; lateral margins very feebly, finely crenate; anterior margin distinct not membraneous anteriorly, base not margined nor impressed, surface sparsely, finely and irregularly punctate; lateral margins and basal margins at middle and sides with moderately long, yellowish hairs. Elytra at base not wider than the prothorax at base, sides nearly parallel; sutural costa scarcely visible, discal costae absent; surface rather coarsely and densely punctate, the punctures much coarser than those of the prothorax; lateral margins with a single row of seta-like hairs. Body below clothed with moderately long yellowish hairs, rather sparsely placed on prosternum, abdomen and femora but very densely on meso- and metasternum tibiae along the median ridge and at sides furnished with long not closely placed, slender spines; tarsi at apex also with a few slender spines and a few shorter ones internally on the second and third joints. Ventral segments of abdomen finely but feebly punctate, penultimate segment rather coarsely punctate and very feebly lobed at middle of apex; last segment rather densely and coarsely punctate at middle, more sparsely at sides, at middle very feebly impressed. Pygidium sparsely punctate at apex but more closely at base. Length, from apex of prothorax to apex of elytra: 10.25 mm.

Female: Differs from the above described male in being wingless, antennal joints and club shorter, the latter about as long as the funicle and not opaque but shining. The eyes are scarcely limited above and rather indistinct, but distinct and finely faceted below; the intermediate and posterior femora and tibiae are shorter and a little stouter; the hind tarsi are slightly shorter than the tibiae and the underside, including the meso- and metasternum, is very feebly pubescent. The claws are smaller slightly more dilated at base than those of the males and one or both are occasionally absent on one or both of the hind tarsi. Superficially the female looks somewhat like a small, pale specimen of *Ligyrus gibbosus.* Length from apex of prothorax to apex of elytra: 9.5 mm.

Alabama, Mobile, November 9 and 16.

This interesting new addition is one of the many good things turned up by Mr. H. P. Löding in whose collection are a pair of paratypes.

The new genus described above does not fit very well in any of the tribes occurring in North America but may be placed for the present with *Phobetus*. *Phobetus comatus* and *Gronocarus hiemalis* have the ventral segments of abdomen not connate, the anterior coxae transverse but prominent internally and the males of both species have almost the same, rather narrow and elongate hind tarsi. Besides the difference in the oral organs *Gronocarus* differs from *Phobetus* in having the anterior margin of prothorax not membranous, the claws of all the tarsi simple, not toothed and the clypeal suture entire, not interrupted at middle.

Phytalus vanalleri n. sp.

Form size and color of *Phyllophaga ephilidia* Say. Head scarcely darker in color, moderately coarsely not densely punctate, clypeus feebly emarginate. Prothorax about twice as wide as long, narrower at apex than base; lateral margin feebly crenulate; basal marginal line more or less distinct at sides, obliterated at middle; hind angles rectangular; surface shinning, moderately coarsely but not densely punctate. Scutellum rather sparsely punctate. Elytra scarcely wider at base than the prothorax, moderately coarsely and closely punctate; sutural costa moderately distinct, the discal and submarginal costae feeble. Pygidium, from a lateral view, rather strongly arcuate, somewhat coarsely but not densely punctate. Abdomen with moderate, not closely placed, punctures. Metasternum densely clothed with rather long hairs. Elevated portion of prosternum behind anterior coxae entire and arcuate at summit, not emarginate. Length: 18 mm.

Male: Antennal club slightly longer than the entire stem. Spurs of the hind tibiae free, moderately long, the outer slightly shorter than the inner; ventral segments of abdomen, one to three deeply impressed at middle, fourth triangularly arcuate at apex, fifth deeply linearly impressed at middle.

Mobile, Alabama (H. P. Löding); Tennessee (O. Dietz).

Type and paratype from Alabama, the latter in Mr. Löding's collection. The Tennessee specimen is smaller than those from Alabama but otherwise agrees in all characters with those from the type locality.

The claws in this species are unequally cleft, the upper portion is narrower and slightly shorter than the lower and has therefore to be associated with *robustus*. It differs from *robustus* in narrower form, more shining and less closely punctured prothorax and the different form of the fourth ventral segment of abdomen, which in *robustus* is scarcely at all arcuate at apex.

This species looks very much like *Phyllophaga ephilidia* Say and without reference to the form of claws would be mistaken for that species. It is named after Mr. Van Aller, an enthusiastic obliging collector and good friend of Mr. Löding.

Phytalus robustus Horn.

This species was described by Dr. Horn from a single specimen from the Berlandiere collection made along the Rio Grande and which he thought may possibly have been collected on the Mexican side of the river at Matamoros. It was taken by the late Professor Snow at Brownsville, Texas.

The last paragraph, under Dr. Horn's description of *robustus*[1] does not belong to this species and is misleading. It is apparently referable to *cephalicus* with which the remarks of this paragraph perfectly agree. The localities, New Mexico and Arizona, in Leng's catalogue are therefore wrong; it should be Texas.

Phytalus cavifrons Linell.

Linell described the apical tooth of the anterior tibiae of the female of this species as obliquely truncate and notched at apex. However this is not constant. One female has the apex of the anterior tooth distinctly emarginate on the left tibia but nearly rounded without trace of emargination on the other, in some specimens the apex is more or less distinctly truncate without emargination in others it is not truncate but rounded at apex.

Polyphylla cavifrons Lec.

This species is recorded in Leng's catalogue from Mexico and doubtfully from Arizona. There is a specimen from Yuma, Arizona, in the Dietz collection which agrees very closely with Leconte's description. It is also recorded from Ehrenberg, Arizona, by Dr. Horn in his revision (1881) from a single specimen.

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[1] Trans. Am. Ent. Soc., Vol. XII, p. 121, lines 11 to 18.

DESCRIPTION OF A NEW THORYBES (LEPIDOPTERA—RHOPALOCERA—HESPERIIDAE).

By E. L. Bell, Flushing, N. Y.

Thorybes diversus n. sp.

Male. Upper side. Primaries brown, with an oblique, transverse, discal band of narrow white spots, one on the costa, a little beyond the center, one across the cell, one in interspace 2 and one in interspace 1, more or less suffused with the brown ground color and often indistinct, in the type specimen these spots are more clear than usual; one white spot outside of the discal band, in interspace 3, just below the end of the cell; three small, white, subapical spots, in an oblique row and in a straight line with each other, sometimes a fourth dot above them slightly out of line inwardly; two small, white, spots, below the subapical series, in interspaces 4 and 5, one or both of which may be absent. Secondaries, brown.

Under side. Primaries brown, paler along the inner margin; narrowly overscaled with whitish along the outer margin; spots of the upper side repeated and more distinct. Secondaries, ground color reddish-brown; darkest at the base; overscaled with brown and whitish scales intermixed, the whitish scales becoming heavier towards the outer margin; the usual transverse bands, at one-third and two-thirds the distance from the base, are narrow, poorly defined and indistinct.

Body, brown above and beneath; legs brown. Fringes of both wings, above, dark brown at their base, paler at their ends, those of the primaries feebly checkered; beneath the same, intermixed with the whitish overscaling, a fine brown line running down the center of those of the primaries. Head brown; palpi brown intermixed with whitish. Antennae, brown above, beneath lighter.

Expanse: 38–40 mm., except one small individual of 36 mm.

Male without a costal fold.

This insect somewhat resembles certain examples of *Thorybes nevada* Scudder, but it is slightly larger, the fringes darker, especially those of the secondaries, the ground color of the upper surface tends to more of a reddish-brown and there is no strigation on the outer half of the secondaries beneath.

The form of the male genitalia is very different from that of any of the described species in this genus in the North American Fauna; the valves are approximately symmetrical, rather broad, provided with two arms, the ventral one terminates in a long sharp tip, which is bent upwards at about a right angle to its lower edge, there is a slight flange on the outer edge about midway between the angle and the tip; the dorsal arm is shorter and contained within the angle of the bent tip of the ventral arm, it terminates triangularly, with the inner point of the triangle touching the upper edge of the ventral arm; the uncus terminates in two, long, sharp points; the oedaeagus is provided with a single, large thorn.

Described from 7 specimens from California; 3 from Colorado, and 1 from Wyoming. The California specimens were very kindly sent to me from the collection of Dr. William Barnes, Decatur, Illinois, by Dr. F. H. Benjamin; the Colorado and Wyoming specimens were collected by Mr. E. J. Oslar, Denver, Colorado.

Holotype, male, Plumas County, California, June 1–7, in collection of Dr. William Barnes, Decatur, Illinois.

Paratypes, 10 males: 4, Plumas County, California, May 24–31, June 8–15; 1, Kenosha Pass, Colorado, July, in collection of Dr. William Barnes, Decatur, Illinois; 1, Plumas County, California, in collection of the American Museum of Natural History, New York City; 1, Plumas County, California, May 24–31; 1, Mill Gulch, Colorado, July; 1, Kenosha Pass, Colorado, July; 1, Casper Mountains, Wyoming, July, in collection of the author.

Popillia japonica in Long Island.—Reports received during the summer indicate that a serious invasion of the Japanese beetle has taken place on Long Island. Mr. Ernest L. Bell, of 438 Amity Street, Flushing, writes under date of August 1st that he finds it feeding on his Wistaria vines and on chrysanthemums in his neighbor's garden. Mr. A. Rickard, of 20 Brevoort Place, Brooklyn, reports it as attacking roses.—GEORGE P. ENGELHARDT, Brooklyn Museum.

NOTE ON LEAF-OVIPOSITION OF ZENILLIA FUTILIS (DIPT., TACHINIDAE).

By Elmer T. Learned, M.D., Fall River, Mass.

The habit of certain parasitic flies, of which *Z. futilis* is one, of depositing their eggs on leaves so that they are ingested by the host, has been recognized for some time. There have been very few contributions on the subject, however, so the following experience seems worth recording.

Some years ago a brood of *Apantesis phalerata* (Harris) was reared from eggs obtained in August from a captured female. The larvae were fed at first on dandelion, later on plantain. Pupation began September 16. On September 24 a parasite grub issued from one of the first pupae, and during the following two weeks some two dozen parasites appeared, sometimes two from one pupa. Rarely a grub issued from a larva which had not pupated. The grubs transformed into the adult flies in about ten days, the first fly emerging October 3.

The following year another brood of *phalerata* was reared from eggs laid in May. The larvae, which were fed on dandelion, pupated in June. Out of thirty-one pupae eleven proved to be parasitized, the grubs first appearing June 26, giving the adult flies July 8. A brood of *Apantesis oithona* was reared at the same time; these larvae were fed on plantain. There was a high mortality from disease and only twelve pupae were obtained, but three of these were parasitized.

The parasite in every case proved to be *Zenillia futilis* (Osten Sacken). The flies were kindly determined for me by Mr. C. W. Johnson.

All the larvae were reared in covered glass jars and were under close observation. It is highly improbable, to say the least, that an adult parasite could have been introduced into several jars without being noticed; the parasites must have been put in with the leaves as eggs or minute larvae.

This is the only instance I ever had of parasitism occurring in larvae reared from the egg, in several years of breeding moths and butterflies. It may be worth noting that until I reared the *Apantesis* larvae I had never had occasion to use either dandelion or plantain as a food plant. It would be interesting to hear from other lepidopterists who have had the experience of introducing parasites into the breeding cages; I do not believe it is a common occurrence.

REMARKS ON GENITALIC CHARACTERS OF SOME PAPILIOS OF THE MACHAON-GROUP (LEPIDOPTERA: RHOPALOCERA).

By Waro Nakahara, Tokyo, Japan.

The relationship of various forms of the Nearctic Papilios of the *machaon*-group has been the source of much discussion among lepidopterists. It seems to be the generally accepted opinion, however, that the species *machaon* is represented in North America by a single subspecies, *aliaska* Scud., other allied forms, such as *bairdii* Edw. and *zelicaon* Luc., being listed as species distinct from *machaon* L. An inspection of specimens leaves one somewhat in doubt as to the taxonomic status of these forms, because of the striking similarity of wing markings existing among them. Verity, in his Rhopalocera Palaearctica, discussing the phylogenetic relationship of the forms of *machaon,* remarks that "*zolicaon*" and "*oregonia*" of North America are in all probability geographical races of *machaon.*

With the hope of throwing some light on the question I was recently led to examine the male genitalia of several forms involved, especially the two Nearctic species above mentioned, specimens of which were kindly given to me by Dr. Wm. Barnes and Mr. F. H. Benjamin when I visited Decatur year before last.

The detailed descriptions and illustrations are out of place in this short preliminary note, especially as I intend to extend the examination to other species of the *machaon*-group in order to complete my observations. I merely state here that it has proved entirely impossible for me to separate the following on the basis of genitalic characters: *P. machaon machaon* L. from Germany, *P. machaon hippocrates* Feld. from Japan, *P. zelicaon* Luc., and *P. bairdii* Edw., and form *oregonia* Edw. For comparison, two Oriental species placed by Rothschild under the *machaon*-group were examined, namely, *P. xuthus* L. (Japan) and *P. demoleus* L. (Formosa). It was found that though these two species agree perfectly with *P. machaon* as to all other points of the male genitalia, the character of the valve (*gonopophyses*), especially that of ampulla, was unmistakably peculiar to each species.

In *machaon* (and in *hippocrates, zelicaon, bairdii,* and *oregonia*) the ampulla is situated along the ventral margin of the valve, and it is in the form of a long comb with fine teeth.

In *xuthus* the general plan is the same but the toothed portion of the ampulla is less than one-third the length of that in *machaon,* and is found near the apex of the valve.

In *demoleus* the ampulla is located along the dorsal margin of the valve and near the base, while the valve itself is essentially narrower and more pointed at the apex than in other species.

I am unwilling at this time to go so far as to suggest that *zelicaon* and *bairdii* might be conspecific with *machaon,* as undoubtedly the data at hand do not justify such an action. I feel, however, that we have an interesting taxonomic problem demanding further consideration in the satisfactory placement of these Nearctic forms.

ESPERANZA TEXANA BARBER FOUND IN LOUISIANA (HEMIPTERA COREIDAE).[1]

By H. G. Johnston, Ames, Iowa.

Esperanza texana Barber, Brook. Inst. Sci. Bull. I, no. 9, p. 270 (1906).

One specimen, a male which is evidently this species, was collected by the writer, August 12, 1926, at Delta Point, Louisiana. This species has been reported only from southwest Texas, the type locality. Barber described the species, for which he erected a new genus, from a single male specimen. In his description he states, "The scutellum is imperfect." Since the scutellum is rather distinctive, I offer the following description of it:

> Scutellum distinctly longer than width at base, apex curved upward forming a conspicuous spine, fuscous at tip, basal half of disk moderately convex, somewhat depressed just before the spinose apex; two longitudinal, parallel rows of fuscous punctures along either side of the median line; lateral edges carinate.

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[1] Contribution from the Department of Zoology and Entomology, Iowa State College, Ames, Iowa.

THE GENUS CLASTOPTERA IN THE AMERICAS SOUTH OF THE UNITED STATES.

By E. D. Ball, Sanford, Fla.

While restudying the species and varieties of *Clastoptera* north of Mexico[1] the writer again went over his material from Mexico, the West Indies and South America, together with the literature, and found varieties of all four of the northern species. Three of these species were widely distributed and apparently many times duplicated in the previous descriptions. Many of these forms will no doubt prove to be distinct varieties and some of the names will antedate the names used in previous publications for the same species and variety. There would, however, appear to be no advantage in making partial substitutions at this time when a thorough study of the southern fauna will be required before any satisfactory revision can be expected or any possibility of a stable nomenclature established.

In the meantime, it does appear possible to refer many of these forms to the appropriate species and to recognize a fifth distinct structural type. The five distinct species which present good structural characters are enumerated below. These species vary in color through pale, spotted or lined, to definitely black forms. In general, the paler forms are large and the darker ones smaller. The first four of these species are characterized in the previous publication.

1. *Clastoptera obtusa* Say (1825) was the first species in the group to be named, so this form will retain that name for the species and for its typical banded and saddle marked variety.

2. *Clastoptera xanthocephala* Germ. (1839) is the oldest possible name for this species unless *cimicoides* Germ. that precedes it should prove to be the same species. *C. cimicoides* is as small as *xanthocephala* and has the banded face but the other characters appear to indicate a variety of *obtusa*. This is the smallest species in the group and the least variable.

3. *Clastoptera proteus* Fitch (1851) is the oldest North American name for this species but Germar's small *nigra* (1839) from Brazil is probably a dark variety, and if so this name will super-

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[1] *The Genus Clastoptera North of Mexico*, by E. D. Ball, Can. Ent., vol. 58, pp. 103–112. 1927.

sede *proteus* for the species but not for that variety. This is a relatively small, globose, sharply black and yellow species with a bright yellow face crossed by a broad black band. This yellow face, or at least the lower half, persists in even the blackest varieties.

4. *Clastoptera lineatocollis* Stål (1854) is apparently the oldest name for this arid region form described from California. Only one of Stål's species precedes this name and none of Germar's descriptions appear to fit this form. The six or seven narrow and definitely black bands on the pronotum, except in the darkest varieties, render this a strikingly distinct species.

5. *Clastoptera ochrospila* Jacobi (1908) described from Bolivia and Peru seems to be a very distinct structural and color type. It is still more globose with the face only slightly produced, the bulla large and placed well back against the apical nervure. The typical form is very strikingly marked, black with the face and a small spot on vertex creamy. There are two immense circular spots on the pronotum, and an equally large pair on the disc of the elytra, the scutellum and a broad rectangle on the closed apices of the elytra yellow.

Germar in 1839 described seven species, two of which were from the United States and have been discussed previously. The other five were from Brazil. Of these *darnoides, cimicoides* and *flavifrons* (Lallemand gives Mexico for this) appear by their pronotal bands and lines on front to be obscure varieties of *obtusa,* commonly found in collections from that region, while *scutellata* and *nigra* both have the characteristic yellow and black face and appear to be black varieties of *proteus.*

Stål in Nya Hemiptera, 1854, described five species, one of which (*lineatocollis* from California) has been previously placed. Three Brazilian species, *sahlbergi, fuscomaculata* (omitted from Lallemand's list) and *obtusata,* all appear to be varieties of *obtusa,* while *funesta* from Honduras is certainly a small black variety of *proteus,* which Fowler reports as abundant in Mexico.

Stål in his Rio Janeiro Hemiptera Fauna, 1862 (1858), lists three Germar species and described seven as new. The first one, *picturata,* is undoubtedly *proteus,* very near variety *flava,* while *pallidiceps* and *tibialis* appear to be dark forms of *obtusa* with light saddles (Lallemand gives these as equalling *scutellata* Germ. but they are described as with lines on front while *scutellata* has the black and yellow of *proteus*). *C. brachialis, nubifera* and *fuscipes* appear to be forms of *obtusa* very close to variety *testacea,* while *femoralis* appears to be a pale yellow form of *xanthocephala.*

Uhler in Proc. Ent. Soc. Phila., 1864, described *undulata* a small dark variety of *obtusa,* and *stolida* a still darker variety near variety *tristis,* both from Cuba. The writer's material indicates that they are distinct from any North American variety.

Berg in Hemiptera Argentina, 1869, described *Considea secunda,* which he later transferred to *Clastoptera.* The small size, lines on face and obscure color all suggest a variety of *xanthocephala.*

Fowler in the Biologia (the first three species *funesta, globosa* and *compta* in 1897, the remainder 1898) lists sixteen species from Mexico and Central America, of which thirteen are described as new. Examples of all four of the North American species have been examined from this region, but Fowler lists only one—*obtusa.* From his description and figures his new forms can be assigned to their proper species and most of them to a definite varietal status, but as their relationship to the older names is still in many cases problematical it will be of little value to go farther than to point out relationships to established forms. Five of Fowler's species appear to be forms of *obtusa,* as follows: *C. antica* is a distinct dark variety near *borealis*; *C. dimidiata* = variety *achatina*; *C. laenata* a small dark form of his *antica,* while *C. semivitrea* and *chiriquensis* are too poorly characterized to be assigned to definite varietal status.

Five of Fowler's new species appear to belong to the *xanthocephala* group, as follows: *C. minima* = typical *xanthocephala*; *C. rufescens* is a tawny variety; *C. unicolor* is the glaucous variety, formerly called *glauca.* All of these forms are abundant throughout the region and are found in all collections. *C. irrorata* is a distinct and somewhat rarer variety, while *C. compta* is apparently a distinct and highly ornamented variety of this usually plain species. Fowler describes it as "black" with an ivory band on pronotum and a broad ivory saddle, but figures an example with a pale tawny ground color. Both forms are at hand and show the normal *xanthocephala* transition in color.

The remaining three of Fowler's new species, as well as *funesta* Stål which he lists, appear to belong to the *proteus* group, as follows: *C. flavivitta* = the common variety *flava*; *C. stali* is shiny black with yellow markings and probably represents a distinct variety from any described; *funesta* Stål, as mentioned above, is a small, dark variety, while *globosa* Fowler is probably the larger female of the same form. He says it is almost four times the bulk but his length lines show little difference. Fowler says " metapodium light yellow "; if this refers to the whole front then it might be a black variety of *obtusa* or *ochrospila,* but as he says it closely resembles *funesta* in structure and color it will probably be found to have the black median band of the *proteus* forms.

Baker in Ent. News, '00, described *C. bimaculata* as new. This appears to be identical with Fowler's figure of the testaceous variety of his *compta,* but as Fowler in his description gives the color as " black " while Baker says " the color of a very pale *xanthocephala,*" the form with the black ground color may be known as *C. xanthocephala* variety *compta* Fowler and the one with the pale background as variety *bimaculata* Baker.

Jacobi in 1908 described a single new species from Bolivia and Peru as *C. ochrospila* that appears from example in the writer's collection to be a new and strikingly distinct type in both structure and color. Along with the typical spotted form there was a single shiny black example that appears to be an unnamed variety. This suggests that this species, like the others, will be found to range through the usual pale, spotted or lined and black forms. From its known distribution it is likely that it will prove to be as common a form in the arid regions of South America as the equally distinct and brilliantly marked *lineatocollis* is for the arid region of North America.

Clastoptera ochrospila variety **nuba** var. nov.

> Slightly smaller than the species, but with the same structure, globose, entirely black above, highly polished; lower half of face white, elytra entirely coriaceous, opaque. Length of male 3.5 mm. Holotype male from Peru in author's collection.

NOTES ON TWO SPECIES OF THE GENUS OLENE (LEPID., LIPARIDAE).

By William Barnes and F. H. Benjamin, Decatur, Illinois.

Our good friend Mr. Frederick Lemmer has been rearing *Olene* species in the New Jersey Pine Barrens and has, most generously, turned his material over to us, asking that we publish thereon, and then return a part of it to him.

Olene lemmeri sp. nov.

♂. Allied to *basiflava.* Ground color rich brown, lacking all the normal white shadings, irrorated with black, and more or less suffused with purple and green tinges; the t. p. line much as in *basiflava,* the t. a. line with the distal points somewhat more acute; reniform very poorly defined; normal tornal white spot obsolete. Hind wing fuscous brown with only a trace of the discal spot, but with a distinct medial shade line.

♀. Similar, but averaging paler than ♂.

Larva. Head blackish brown, paler brown on vertex and laterally, whitish above mouth. Body dirty gray, obscurely mottled with black and with a yellowish tinge; a blackish dorsal and brownish stigmatal band; the normal black hair pencils on joint 2 (those of joint 13 lost probably in inflation); lateral hairs long, dirty fuscous brown and apparently without the normal admixture of jet black hairs (unless these have been lost in inflation); joints 5, 6, 7, 8 and 12 with unicolorous fuscous brown square tufts unmixed with any white hairs.

Type locality: Lakehurst, N. J. (Lemmer).

Number and sexes of types: Holotype ♂, VIII–2–1926; Allotype ♀, VIII–17– ; 14 ♂, 4 ♀ Paratypes, VIII–2 to IX–6; all ex ova; also two inflated larvae.

Olene aridensis Benj.

1922, Benj., Can. Ent., LIV, 197, *atomaria* form, *Olene.*

Larva. Head blackish in front, brown above and at sides. Body dirty yellowish, marbled with black; a black dorsal stripe and black interrupted dorso-lateral and stigmatal stripes; tufts on segments 4–7 squarely cut, pale brown with a few white hairs laterally, joint 12 with a darker discolorous tuft; hair pencils on segments 2 and 13 moderate, black, supported by whitish and blackish hairs; other warts with small tufts of white and black hairs.

We do not know of any species with a similar larva, and conclude that *aridensis,* described as possibly a variety of *atomaria,* is a distinct species.

ON SOME AMERICAN PYRRHOCORIDAE [HEMIPTERA].

By Roland F. Hussey, New York City.

Euryophthalmus priscillae n. sp.

Largus humilis [nec Drury], Bueno, 1914, Anal. Mus. Nac. Buenos Aires, xxvi, p. 159.

> Blackish or dark cinnamomeus; pronotal collar and lateral margins anteriorly, narrow basal margin of pronotum, a broad fascia on the hemelytra as wide as the claval commissure, extended anteriorly somewhat on the exocorium but not reaching its base, and a second narrower fascia just before the apical angle, sometimes more or less interrupted at its middle, extreme tip of scutellum, posterior half of each connexival segment, apical portion of last dorsal segment (♂), posterior margin of metapleura, first ventral segment entirely (as far as visible) a triangular spot at the posterior lateral angles and a narrow fascia on the posterior margin (not reaching the lateral margin) of segments 2 to 6 of the venter, yellow. Anterior lobe of pronotum black, posterior lobe paler, darkened toward the sides, coarsely but rather closely punctate; posterior portion of propleurae testaceous, with a few black punctures. Legs and antennae piceous-black; base of first antennal segment, coxae, trochanters, and base of all femora, testaceous. Membrane sordid gray, with an obsolete pale spot at base as if continuing the subapical yellow fascia of the corium; veins black, coarsely and irregularly reticulate. Hemelytra reaching middle of last dorsal segment (♂); exocorium with extremely fine concolorous punctures; mesocorium and clavus with a few coarse punctures at base, the latter also with a few punctures next the commissural margin. Head with eyes about as wide as anterior pronotal lobe; pronotum 2/5 wider than long as seen from above, the lateral margins distinctly sinuate. First antennal segment 1/10 shorter than pronotum; ratios of antennal segments, 9:5:3:8. Rostrum reaching middle coxae. Length 10½ mm.; width across base of pronotum 4 mm.; maximum width, across apex of clavus, 4½ mm.

Argentina: Chaco de Santiago del Estero, Rio Salado. Type in Bueno's collection.

Very near *E. fasciatus* (Blanchard), differing by its shorter stature and somewhat broader form, the much more thickly punctate pronotum, the reticulately veined membrane, the abdominal segments all narrowly margined behind with yellow.

Euryophthalmus balteatus var. **thoracicus** n. var.

Structurally indistinguishable from *E. balteatus* (Stål), but with the posterior lobe of the pronotum pale whitish yellow.

BRAZIL: Matto Grosso, Corumbá, February. Type in H. H. Smith Collection, American Museum of Natural History.

The Smith collection also contains two specimens of typical *balteatus* from this same locality; and I have one specimen labelled "Peru," obtained from Staudinger & Bang-Haas. This species has hitherto been reported only from Bolivia. I am not at all sure that it can be maintained as distinct from the common *E. humilis* (Drury), of which I suspect it to be merely a well-marked color form.

Largulus n. gen.

Oblong, parallel. Head somewhat oblique, shorter than its width with the eyes, gula not sulcate, bucculae low, not or scarcely extended backward as far as the antenniferous tubercles; eyes very slightly stylate; vertex flat or very slightly convex; rostrum reaching the metasternum, the first segment reaching almost to base of head, first three segments subequal, fourth shortest; antennae rather slender, about as long as the pronotum and corium together, first segment longer than the width of the head, lightly curved, slightly thickened toward the apex, fourth segment longer than the first, third shortest. Pronotum about one-third wider than long, narrowed anteriorly; disc of anterior lobe scarcely (♀) or lightly (♂) convexly elevated; posterior lobe (except the lateral margins) distinctly punctate, anterior lobe smooth except for a few punctures on the depressed anterior margin and a few obsolete points on the lateral margins; lateral margins narrowly but distinctly carinate, not at all reflexed, the carina extended anteriorly to the collar-like depressed anterior margin. Scutellum subequilateral, transversely depressed at base, the lateral margin scarcely sinuate. Hemelytra complete; costal margin of corium most lightly ampliate (♀) or straight (♂), apical margin straight, equal in length to the claval suture, apical angle subacute. Anterior coxae unarmed; anterior femora with subapical spinules. Odoriferous orifices not auriculate. Abdomen parallel (♂) or very slightly wider at the middle (♀), scarcely wider than the hemelytra; incisures between segments 3–4 and 4–5 lightly curved anteriorly near the lateral margins but transverse at the margins themselves. Glandular spots on segments 4 and 5 arranged as in *Euryophthalmus*. Sixth ventral segment of female divided.

Type: *L. parallelus* n. sp.

Closely allied to *Euryophthalmus* Lap., differing by its more slender form, its non-ampliate hemelytra, its carinate pronotal margins, its more slender antennae, and its apical corial margin as long as the claval suture.

Largulus parallelus n. sp.

> Honey yellow (sometimes crimson); head, an irregular spot on each pronotal callosity, base of scutellum each side of median line, and hemelytra (except costal margin, apical angle, and narrow apical margin, and base and apex of cubital vein on corium, and inner and commissural margins of clavus), black. Beneath black, abdomen somewhat bronzy. Head, sternum, and pleura with pale sericeous pubescence, pronotum anteriorly with several remote black setulae. Head wider than long; antennae testaceous, the first three segments lightly infuscated toward their apices, fourth segment piceous, its base sometimes pale, first segment ¼ longer than width of head, and 1/5 longer than pronotum, ratios of segments, 15: 10: 7: 16. Rostrum testaceous, the basal segment piceous, apex attaining middle of metasternum. Pronotum with the lateral margins lightly sinuate; posterior lobe and scutellum remotely punctate with black. Hemelytra reaching apex of abdomen; veins of membrane not anastomosing. Legs testaceous; anterior femora with a large and one or two smaller subapical spines. Length, ♂ 7, ♀ 8 mm.; humeral width, ♂ 2, ♀ 2½ mm.

JAMAICA: Cinchona, 5,000 feet, Jan., 1912 (C. T. Brues). Type, allotype, and paratypes in my collection. Also three paratypes from the same locality, Feb. 25–26, 1911, in American Museum of Natural History. All of these specimens pertain to the yellow form of the species.

Mr. Barber has shown me a single specimen, also from Cinchona, collected in July, 1923, in which the honey yellow of the typical form is replaced by a deep crimson. Otherwise this one individual shows no significant variation from the type. It may be that this red phase is a seasonal variant, but the material at hand is much too scanty to determine its status exactly.

Theraneis isobel n. sp.

> Black, somewhat shining; corium and clavus gamboge yellow, the latter and the exocorium obsoletely concolorously punctate, endocorium with a row of distinct punctures next the claval suture, mesocorium smooth, costal margin most

lightly sinuate; membrane dull black, apical margin narrowly, basal margin more broadly, bordered with white. Antennae testaceous, basal joint (except the apex) and extreme apex of the fourth, black; ratio of segments 26:15:12:26, length of second segment equal to interocular distance. Rostrum reaching base of mesosternum. Head formed as in *T. pulchra* Dist., its width with the eyes 1.6 mm., interocular breadth 0.8 mm.; sides of head anteriorly with sparse silvery pile.

Pronotum 2.0 mm. long, humeral width 2.2 mm., anterior width 1.2 mm., the two lobes about equally long, the interlobular sulcus rather broad, lightly curved, filled with minute silvery pile, the posterior lobe with an abbreviated median line of silver pile, extending from the sulcus backward about to the middle of the lobe; pronotum (except the callosities) covered with minute matted black pubescence; pronotal collar and posterior lobe distinctly punctate. Scutellum about 1/5 longer than wide, dull black, the apex testaceous, distinctly punctate. Beneath black, shining; sterna, and pleura less densely, silvery pilose. Posterior margins of ventral segments with a narrow band of silvery pile, interrupted at the median line; the segments laterally with a few remote erect black hairs; female genital segment, as also the middle and hind tibiae and the clavate portion of the posterior femora, with remote erect pilosity.

Length (♀) 9 mm., maximum width 2¼ mm.

Honduras: Tela, Guaimas District, 5:V:1923 (T. H. Hubbell). Type in Museum of Zoology, University of Michigan.

Very near *T. pulchra* Dist., but broader, more strongly shining, the femora a little more strongly clavate, the corium and clavus yellow, and the silvery pile otherwise distributed.

Genus *Thaumastaneis* Kirk. & Edw.

In their original characterization (1902, Wien. Ent. Zeit., xxi, p. 164, pl. III, figs. 4, 4a), Kirkaldy and Edwards compared this genus to *Theraneis,* but the two genera really have little in common. As a matter of fact, *Thaumastaneis* is most nearly related to *Arhaphe* and *Japetus,* differing from them by the long slender neck-like base of the head, the shorter rostrum, the broad deep impression between the pronotal lobes, the large pre-humeral spine of the posterior lobe, the strongly brachypterous condition, etc. Inasmuch as the original description is so incomplete, omitting several important characters such as the form of the bucculae, the structure of the odoriferous orifices, the scutellar tubercle, *et al.,* I have thought it best to give a more complete account of the generic characters. This I have supplemented with outline drawings of the type species, as the original figures are inaccurate in many respects: lithographic work in color, even in the hands of so competent an artist as Horace Knight, does not lend itself well to the representation of structural details.

Head obliquely declivous beyond the slender cylindrical neck, transversely convex above and below, almost quadrate anteriorly as seen from above (fig. 4 of Kirkaldy & Edwards represents the head as too long), but as seen from in front, much narrowed and shortly triangularly produced in front of the antennal insertion. Bucculae much higher than long, angularly rounded at apex, posterior margin somewhat oblique. Gula not sulcate. Rostrum hardly passing base of head, first joint slightly the longest, second and third subequal, fourth slightly the shortest. Antennae moderately thick, the segments only lightly narrowed toward the base, first joint slightly longer than fourth, third much the shortest. Eyes very prominent, hemispherical, extremely short-stylated. " Neck " inserted at middle of vertical depth of head. Pronotum not one-half longer than deep, divided into two lobes by a broad deep sulcus; anterior lobe three times as long as posterior, glabrous, impunctate, shining, convexly declivous anteriorly to the distinct pronotal collar, which continues onto the ventral side of the thorax, though somewhat narrowed at the sides; interlobar sulcus and posterior lobe with a few coarse punctures. Lateral margins of posterior lobe just before the humeral angles with a long erect conical spine, directed slightly outward and backward, sometimes slightly curved in its apical third. Basal margin of pronotum broadly shallowly sinuate. Scutellum twice as long as broad, its disc with a blunt conical tubercle simulating the petiolar node of an ant. (This tubercle is much larger in the nymph than in the adult.) Hemelytra rudimentary, about twice as long as the scutellum. Head, pronotum, neck, hemelytra, abdomen (sparsely), and all femora with rather remote erect hairs. Anterior femora with a small tooth beneath near apex; first joint of posterior tarsi one-half longer than second and third together. Metasternal orifices transverse, their apices somewhat elevated from the pleuron, not at all auriculate. Abdomen fusiform (♀) or oblong-ovate (♂), strongly convex below, less convex above, extremely shallow at base, the first dorsal segment deeply depressed below the level of the second; first visible ventral segment strongly impressed at each side, leaving the basal half of the segment somewhat carinate on the mid-ventral line. Genital segments (♂, ♀) and sixth ventral segment (♀) constructed on the same plan as in Myodochine Lygaeidae.

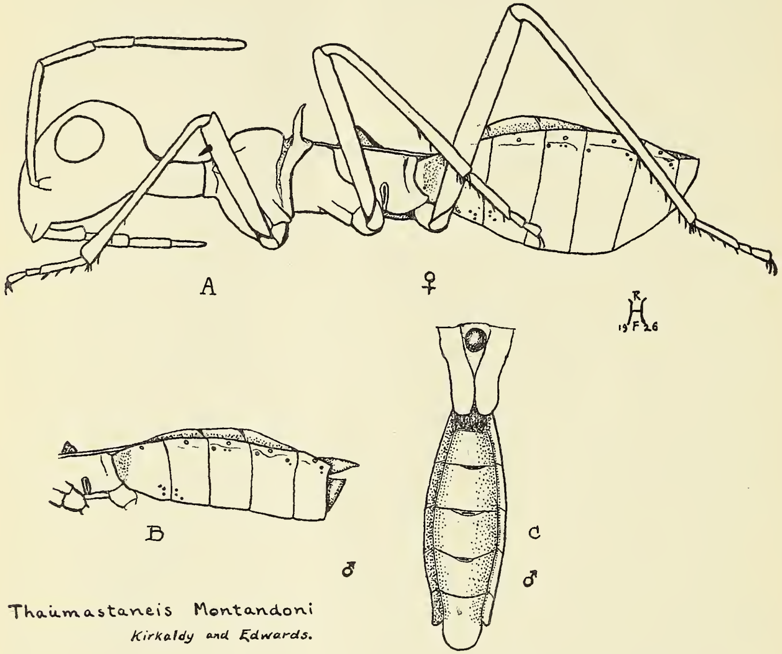

Figure 1. *Thaumastaneis montandoni* Kirk. & Edw. A, Female, lateral aspect. B, Metathorax and abdomen of male, lateral aspect. C. Scutellum, hemelytra, and abdomen of male, dorsal aspect.

Thaumastaneis Montandoni Kirk. & Edw. (Fig. 1.) ♂: Brachypterous, similar to the female, the abdomen less narrowed apically; last dorsal abdominal segment projecting by 1/3 of its own length beyond apex of connexivum. Length 9 mm., maximum width (across eyes) 2½ mm.

This species was described from a single female taken at Játaby in the extreme southern part of the state of Goyaz, and at that time the authors surmised that the male was "wahrscheinlich geflügelt." This surmise, however, is now found to be incorrect. I have before me one male, two females, and one fifth-instar nymph of the species, forming part of the H. H. Smith collection in the American Museum of Natural History. These bear the label

"Chapada"; and, if I am correct in assuming that this refers to the Chapada in the state of Maranhão, then the known range of the species is extended about one thousand miles to the north from the type locality.

Dysdercus bidentatus n. sp.

D. concinnus [partim] Distant, 1883, Biol. Centr. Amer., Rhynch. Het., i, p. 231, Tab. XXI, fig. 11.

Head reddish, not at all shining; tylus, especially toward the apex, piceous; vertex with a large black spot which usually has the form of an inverted trapezoid; length 1.6–1.7 mm., width 1.8–2.1 (average 2.0 mm.), interocular width 1.2 mm.; ratios of antennal segments (average) 10:8:5:15½, second segment subequal to or very little longer than width of head; antennae black, base of first segment testaceous; head beneath testaceous; rostrum reaching the middle of third ventral segment, black, the basal half of the first joint and the incisures flavo-testaceous.

Pronotum with the lateral margins more distinctly reflexed and a little wider than in *D. concinnus* (especially next the callosities), and the lateral margin commonly much more deeply sinuate; length of pronotum 2.0–2.3 mm. (average 2.2), humeral breadth, ♂ 3.2–3.6, ♀ 3.8–4.1 mm. (average 3.6 mm.), posterior lobe twice as long as anterior, the callosities and the collar about equally long on the median line; collar and posterior lobe (except the reflexed lateral margin) black, the extreme anterior margin of the former narrowly pale; callosities reddish ochraceous; lateral margins testaceous, more or less darkened anteriorly. Scutellum black, the extreme apex ochraceous.

Corium and clavus ochraceous, sometimes almost white, the former with the extreme apical angle black and with a large subfasciate postmedian black spot, more or less rounded internally, this spot with its anterior margin almost transverse laterad of the cubital vein; membrane black, the apical margin white, this white border not extended anteriorly to apex of corium.

Beneath testaceous, sometimes rufo-testaceous; propleura ochraceous; all acetabula reddish, those of the meso- and metathorax bordered with, or sometimes entirely, black. Venter testaceous, becoming reddish on apical segments; all segments with their anterior margins black, these black markings broadest on the 5th and 6th segments; often showing a tendency to break up into a series of almost linear transverse markings at each side and a series of triangular or subquadrate spots on the midventral line.

Male genital segment (Fig. 2) oblique as seen from the side, the genitalia exposed in all the males that I have seen; apical margin of the genital segment with two distinct spinose teeth, rather remote from one another, one on either side of the median line; genital claspers very distinctive of the species.

Length, 11.5–14.8 mm. (average, ♂ 12.3, ♀ 13.7); maximum width across hemelytra 3.9–5.2 (average, ♂ 4.2, ♀ 4.8).

Holotype: ♂. PANAMA: Volcan de Chiriqui, 2–3,000 ft. (Champion), in Museum of Comparative Zoology.

Allotype: ♀. PANAMA: Canal Zone, Barro Colorado, 12: XI: 1923, in American Museum of Natural History.

Paratypes: ♂ ♂ and ♀ ♀. PANAMA: same date as allotype. COSTA RICA: Pacayas (C. Werckele). HONDURAS: Progreso, 19: III: 1923 (T. H. Hubbell); Tela, Guaimas District, 17: III: 1923 (Hubbell). In American Museum of Natural History, Museum of Zoology of the University of Michigan, and my collection.

Distant's remarks (*loc. cit.*) anent the variability of *D. concinnus* were due, in part, to the fact that his series of specimens included the present species as well; the holotype described above is from the "Biologia" material and bears the label "*Dysdercus concinnus*," while Distant's Fig. 11, as indicated above, certainly represents *D. bidentatus*. Mr. China informs me, however, that the British Museum collection now contains no specimens of this species.

Apart from the very distinctive male genitalia, *D. bidentatus* differs from *concinnus* in the coloration of the venter, the longer rostrum, the longer fourth antennal segment which averages ½ longer than the first (1/5 longer in *D. concinnus*), and the form of the black spot on the corium: this last difference is clearly shown in Figs. 11 and 12 in the "Biologia." The bicolored head also seems characteristic, as I have seen no specimens of *concinnus* in which the head is not unicolorous, either red or black.

The antennal characters must be used with caution, however, in separating these two species. While the *average* ratios of segment IV to segment I are quite distinct, yet the range of variation is such that, with a longer series of specimens, I should not be surprised to find the two to overlap. Thus, in the series of *D. bidentatus* before me, this ratio ranges from 1.36 to 1.60, the females averaging a little higher than the males, and in sixteen specimens of *D. concinnus* it varies from 1.08 to 1.31.

Dysdercus albidiventris Stål.—This species appears to be the most variable of all the continental American species of the genus. All the various color phases, however, can definitely be allocated to *albidiventris,* because of the agreement which they exhibit in the male genital claspers. These are very distinctive (Fig. 2), and are infallibly diagnostic of this species.

At one extreme is an apparently rare melanistic color variety of which I have seen two specimens from Pacayas, Costa Rica. These present a dorsal picture very similar to that of *D. bidentatus,* while the ventral coloration is like that of a *D. concinnus* in which the red is more or less replaced by black. From those two species, however, this form is readily separated by its smaller size, narrower pronotum, and longer head, as well as by the genital claspers. Mr. Barber agrees with me in identifying this form with *D. splendidus* Distant, which thus sinks as a synonym of *D. albidiventris.*

The other extreme is found in a pale form which has often been misidentified as *D. ruficollis* (Linn.), but which is readily separable from all the complex of species to which the true *ruficollis* belongs by having the fourth antennal segment concolorous at the base. I have seen this form of *albidiventris* in collections from Honduras, Panama, Colombia, and Ecuador; and I seriously doubt the occurrence of *ruficollis* in Central America, north of Panama at least. The "*ruficollis*" of Distant (Biol. Centr. Amer., Rhynch. Het., i, p. 233, tab. XXI, figs. 20, 21) is certainly *albidiventris.*

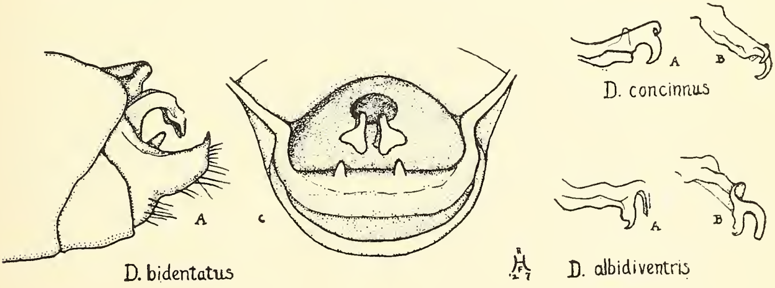

Figure 2. Genitalia of *Dysdercus.* A, lateral aspect. B, dorsal aspect. C, postero-dorsal aspect.

EDITORIAL.

To Our Readers.

Now and again the BULLETIN likes to take its faithful subscribers and readers behind the printed page and show how it is done—of course, with a purpose behind it.

We have, for some years past, pursued the policy of enlarging our publication, steadily though slowly, in the measure that our income grew from subscriptions and other sources. As the BULLETIN stood in 1926, our total income for the publication failed to cover our total cost, a deficit made up from the general fund of the Society. We gave our readers over 220 pages for their $1.50, which makes our publication the least costly on a per page basis—less than ¾c. per page. The only other publication giving its readers more for their money was the *Canadian Entomologist,* which enjoys a government grant and can afford it.

This year, so far, we have published 240 pages (with this number); and will give our readers about 320 pages for the year, as much as *Entomological News,* the subscription price of which is $3.00 per annum. We are enabled to do this by a special contribution to our publication fund. But if we wish to continue, we must depend on the backbone of every publication—namely, the subscribers. We must look to you, our friends, for the added cost of an enlarged and improved publication; and this means an increased subscription price. So, for the coming volume—XXIII—in 1928, we have set the subscription price at $2.50.

We ask our subscribers to note, however, that our per page price *still* continues the lowest of the entomological publications, at about ¾c. per page or less.

We confidently anticipate the favorable responses of all our good friends and subscribers, and indeed, in view of our enlarged size and the wider scope it allows, we look forward to a larger subscription list.

BOOK NOTES.

General Catalogue of the Hemiptera—Introduction—Fascicle I.—Membracidae, by W. D. Funkhouser, Ph.D. (Published by Smith College, Northampton, Mass. 14 unnumbered pages. 1–581. Price, $3.60 postpaid.)

The first volume—or fascicle—of this long-expected and important undertaking is now before us. Its high character will compel its successors to maintain the strictest standards to equal this very competent beginning.

The editorial board, headed by the veteran hemipterist, Dr. Geza Horváth, of Budapest, as general editor, and Dr. H. M. Parshley, of Smith College, as managing editor, numbers the most active of the American hemipterists—Barber, Drake, Funkhouser, Hungerford, Knight, Metcalf and de la Torre-Bueno. Unfortunately, since the inception of the work, Dr. Evald Bergroth, who shared with Dr. Horváth the honor of being the world's leading hemipterist, has died. This leaves the editorial board—so far as its most active members go—purely American, which is to them a perilous honor and a high responsibility.

Dr. Horváth contributes a preface—in French—in which he sets forth the general plan of the work and establishes the principles which will govern authors. He also discusses at length the nomenclatorial standards to be observed.

A List of the Families (of the entire order) follows this preface, systematically arranged and recognizing 45 families in the Heteroptera and 19 in the Homoptera. Avowedly, this list is neither complete nor final, but rather a norm and a running index to the work as it may progress.

The body of the Catalogue of the Membracidae is preceded by an introduction by Dr. Funkhouser, in which he sets forth the principles he has followed in this work; then follows the systematic arrangement of the subfamilies, their tribes and genera. Funkhouser recognizes 6 subfamilies, 4 tribes and 289 genera. Unfortunately, the species are unnumbered, so it is impossible to say how many are listed without actually counting them. This is a deficiency in a splendid work, for certainly at times it is well to count species for statistical purposes, which this omission makes difficult.

All synonyms, beginning with the family, are given. The genera in the subfamilies and tribes are arranged alphabetically, which, while convenient as a ready index, does not permit the Catalogue to be used in arranging a collection, although in an extensive catalogue the failure of authors to indicate affinities of species makes impossible a systematic arrangement to include all, or even a majority, of species in a genus. All generic types are cited, as well as all published records of distribution of species. The work is in effect a universal index to all the described genera and species of Membracidae.

An extended bibliography covers 34 pages, followed by a generic index and an index of species.

The whole work runs to 581 pages and is a monument to the painstaking care of its author. The printing is beautifully done on excellent paper. The higher technique of bookmaking is splendidly exhibited in this work.

Smith College merits the most sincere admiration of biologists at large and entomologists in particular for the invaluable service it is rendering these sciences.

This first modern and thoroughly scientific catalogue of a fascinating group of insects, because of their remarkable forms and structures, is a necessity to every technical library of entomology as a reference book and as a model.

Guide to the Study of Fresh-water Biology, by James G. Needham and Paul R. Needham. (The American Viewpoint Society, 13 Astor Place, New York, N. Y. $1.00.)

Here we have a book designedly to inform the general student and to aid him in the recognition of the more common forms to be found about and on and in bodies of fresh water. The purpose the authors set themselves " is to aid those who study fresh-water organisms in their natural environment." This book consists mainly of keys and plates to aid in determining the usual run of aquatic forms, both animal and vegetable, to be met in collecting. So far as our experience goes, both are adequate for the purpose. Of course, it would naturally be impossible to cover every species, but as it is, there are nearly 475 forms illustrated at least to genera, in the first part of the book. Part II describes collecting methods and apparatus, and outlines 25 studies in fresh-water biology.

This is the nearest approach we have seen to a true semi-popular work, which is at the same time simple, accurate and adequate. It should be of great use to the amateur, who fishes the ponds and streams, to help him to know what he has in hand, and thus increase his pleasure and profit. It will also serve as an introduction to more extended study and to the larger works.

From our point of view, it might seem as though stiff cloth binding with rounded corners might make it more handy. But such details will correct themselves in time.

Meantime, it is the most competent and most useful thing of its kind we have seen. We can recommend it heartily.—J. R. T. B.

PUBLICATIONS OF THE BROOKLYN ENTOMOLOGICAL SOCIETY.

Explanation of All Technical Terms Used in Entomology. By John B. Smith, Sc.D. (The Glossary) Cloth	$3.00
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EXCHANGES.

This one page is intended only for wants and exchanges, not for advertisements of articles for sale. Notices not exceeding THREE lines free to subscribers. Over lines charged for at 15 cents per line per insertion.

Old notices will be discontinued as space for new ones is needed.

We wish to procure in exchange or on cash: *Parnassius of North-America,* with his varieties and aberrations, well labelled, spread or in papers (clodius, smitheus, eversmanni). Dr. Staudinger & A. Bang-Haas, Dresden-Blasewitz.

THE MUSEUM of the Brooklyn Institute has a few uncolored sets of the Calverly, Weidenmeyer and Edwards plates of North American Sphingidae for exchange or for sale at $5 per set. Address, Librarian, Brooklyn Museum, Eastern Parkway, Brooklyn, N. Y.

LEPIDOPTERA from the Mountains of Kentucky. Papilios and other var. of this section collected. Paper spec. of *Xylophanes tersa* and *Catopsilia eubule* on hand. Also Cocoons of the larger Saturnid moths. Ellis Chandlee, Barbourville, Ky.

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NEW ARRIVALS.—From Colombia, French Guiana, and Brazil. Brilliant tropical Lepidoptera for scientific and decorative purposes. H. S. Parish, 14 Briarcroft Road, Toronto, Ont., Canada.

CYNIPIDAE.—Galls and bred wasps wanted to determine or in exchange. Alfred C. Kinsey, Indiana University, Bloomington, Indiana.

WANTED.—Am studying the bionomics of the corn billbugs and desire the privilege of examining *Calendra* (*Sphenophorus*) from all parts of the world. A. F. Satterthwait, U. S. Entomological Laboratory, Webster Grove, Mo.

DIURNAL LEPIDOPTERA.—Have many desirable western species to exchange, including *Argynnis atossa, macaria, mormonia, malcolmi, nokomis; Melitaea neumoegeni; Lycaena speciosa;* etc. Send lists. Dr. John A. Comstock, Southwest Museum, 4699 Marmion Way, Los Angeles, Calif.

WANTED.—Ants from all portions of the United States for determination or exchange. Will also exchange other insects for ants. M. R. Smith, Assistant Entomologist, State Plant Board, A. and M. College, Miss.

Vol. XXII DECEMBER, 1927 No. 5

BULLETIN

OF THE

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11 North Broadway, White Plains, N. Y.

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Vol. XXII December, 1927 No. 5

TWO NEW SPECIES OF PENTATOMIDAE FROM THE SOUTHERN UNITED STATES (HEMIPTERA—HETEROPTERA).

By H. G. Barber, Roselle, New Jersey.

Euschistus atromaculosus n. sp.

=*E. bifibulus* (nec Palisot de Beauvois) Van Duzee, 1904; Barber, 1906, 1914; Blatchley, 1926.

Pale brunneo-testaceous, heavily fusco-punctate, especially on head and anterior face of pronotum. Scattered black spots on the corium. An indefinite, irregular, pale impunctate streak across the pronotum on a line with the humeral angles. Antennae pale testaceous at base, lightly embrowned towards apex; this and the pale testaceous legs immaculate.

Head slightly wider than long; closely fusco-punctate to extreme edge, more sparsely so on tylus which projects anteriorly very slightly beyond apices of jugae; lateral margins above the position of the antenniferous tubercles strongly sinuate; apex semicircularly rounded. Antennae pale testaceous, apically slightly tinted with brown, second segment short, two-fifths as long as third, fourth and fifth equal, each one-fifth longer than third. Rostrum reaching to middle point of posterior coxae. Pronotum strongly and irregularly punctate to the extreme edge, punctures often aggregated; the rather obvious transverse smooth streak may fade out before reaching the humeral region and ramifications of this streak here and there invade the anterior disk for a short distance, so that it is not sharply demarked; lateral margin lightly but broadly sinuate, the extreme edge to just beyond the middle serrate with 6–8 pale irregular teeth; the humeral angles somewhat prominently projected, obtusely angled at apex. Scutellum more evenly, closely and finely punctate than pronotum, with a few scattered pale pustules along the sides, the apex narrowly rounded, concolorous. Corium inwardly more sparingly punctate than the scutellum, much more closely punctate on the broad costal area without the vein. The membrane sordid hyaline. The narrowly exposed connexivum closely punctate, the segments somewhat infuscated at base, with a small pale area in the center of each. Beneath pale testaceous, immaculate; the venter with faint unicolorous sparse punctures. The male genital segment is only a little shorter than the length of the sixth ventral segment and nearly four times as wide as it is long; the posterior margin is almost truncate, obsoletely widely concavely arcuated between the lateral rounded lobes. Length 11–12 mm. Humeral width 7 mm.

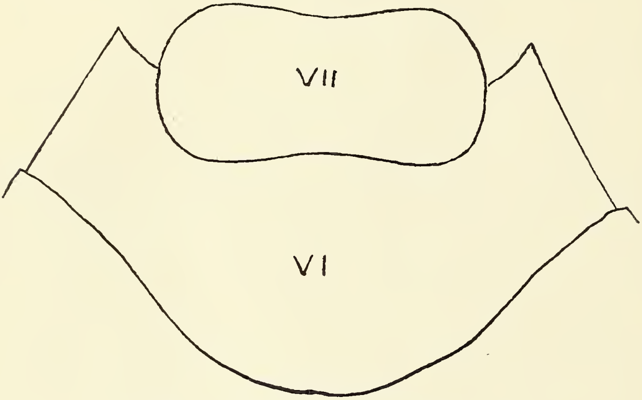


Fig. 1. *E. atromaculosus*, ♂.

Type: ♂, Miami, Fla., March 31, collected by J. N. Knull; allotype, Miami, Fla., Oct. 24, 1915, collected by Wm. T. Davis. Paratypes, Indian River District, Fla., July, 1896; Titusville, Ga., March 20, 1903, collected by T. D. O'Connor; Pass Christian, Miss., March; Brownsville, Texas, June, 1903; Ft. Myers, April, 1912; Enterprise, Fla., April, 1887; Chokoloskee, Fla., April 8, 1912, collected by W. T. Davis; Lakeland, Fla., November 7, 1911, collected by W. T. Davis; Pass Christian, Miss., March; Brownsville, Texas, June, 1903; all in author's collection; Crescent City, Fla., April, 1908, collected by E. P. Van Duzee and in his collection; Lake Okechobee, May, and Ft. Myers, April (collection A. M. N. Hist.).

In 1904 Van Duzee characterized this species in his Catalogue of the Pentatomidae as *E. bifibulus* P. B. It has been so treated by myself in both my Hemiptera of South West Texas, 1906, and my Florida List, 1914. Likewise Blatchley deals with it as Palisot de Beauvois species. Quite recently in studying *E. bifibulus* and *crenator* from the West Indies and South America I discovered that this common Floridian species is quite distinct. Besides its generally larger size, the most striking difference is found in the shape of the male hypopygium; the head is differently shaped and the black spots on the corium are quite characteristic. I have not seen the true *bifibulus* from the U. S. but I have several specimens of *E. crenator* from Texas.

KEY TO SPECIES.

1. Humeral angles obtusely angled. Apex of head rather broadly semi-circularly rounded. Corium spotted with black. Male hypopygium broadly, obsoletely sinuate between the rounded lateral lobes. Species larger, 11–12 mm. long. **atromaculosus** n. sp.
   Humeral angles usually acute. Lateral margins of the head converging anteriorly to a narrowly rounded apex. Male hypopygium more evidently notched or sinuated in the middle. Corium not spotted with fuscous. Species smaller, 8–9 mm. long .... 2.
2. Male hypopygium sub-parallel sided, broad; widely obtusely sinuate in the middle .... *bifibulus* Pal. de B.
   Male hypopygium with sides converging posteriorly, more or less strongly, obtusely notched or angulated in the middle. *crenator* Fab.

Rhytidolomia schotti n. sp.

Sordid testaceous, slightly shining. Corium with a fuscous stripe just within the sub-costal vein which does not reach base or apex of the corium. Beneath pale testaceous.

Head nearly one-third wider than long; sparsely punctate with ferrugineous; the base with six abbreviated rows of ferrugineo-fuscous punctures; the three lobes of equal length, the jugae rounded at apices; the lateral margins rather strongly sinuate above the antenniferous tubercles; the extreme edge narrowly impressed; the ocelli three times as far apart as the distances of each from the eye. Beneath sparingly punctate with ferrugineous, between eyes and base of antenniferous tubercles and between the latter and the bucculae. Antenniferous tubercles outwardly armed with a minute inwardly curved spine, much shorter than in *saucia* and *senilis*. Antennae with the basal segment short, pale testaceous, the remainder reddish with the terminal one embrowned; the second very slightly shorter than third; fourth one-third longer than second and fifth not quite one-third longer than fourth. Rostrum about reaching to posterior margin of second ventral segment, the basal segment not reaching base of head; second segment slightly longer than third segment which in turn is slightly longer than the apical one. Pronotum only a trifle longer than the head, sparsely punctate with ferrugineo-fuscous arranged in somewhat irregular transverse rows; with an obscure median, longitudinal paler line; lateral margin nearly straight, the extreme edge narrowly impressed and very lightly reflexed; the humeri lightly notched just behind the obtuse angle. The pleura pale testaceous, sparingly punctate with ferrugineous; the odoriferous orifices with a very short anteriorly curved gutter. Scutellum shaped as in *R. saucia,* more closely punctate with fuscous than the pronotum, with a faint pale longitudinal median stripe. Corium inwardly sparsely punctate, with a black stripe just within the sub-costal vein as in *saucia*; which does not reach the base or apex of the corium; the costal area pale testaceous with ferrugineous punctures, but finer and more closely set than on disk. Membrane extending but very slightly beyond the abdomen, fuligineous hyaline. Connexivum pale testaceous, immaculate. Venter pale testaceous, faintly aciculate punctate, immaculate except for slight ferrugineous shading about the spiracles. The genital segment short, broadly obtusely sinuate, with a minute rounded lobe either side of the median point of apex of sinus; the lateral lobes of genital segment obtusely rounded, extending but slightly beyond the obtusely rounded apical angles of the sixth segment. Legs including the tarsi pale testaceous, sparsely provided with short hairs. Length 9.5 mm.

Type: Male, Mobile, Alabama, June 7, 1922 (collected by H. P. Loding).

This species is most closely related to *R. saucia* Say, from which it can be readily distinguished by its smaller size, paler coloration, shorter spine at apex of antenniferous tubercles, the notched humeral angles, reduced pilosity on body and legs, etc. This single male specimen was turned over to me for study by my friend, Mr. F. M. Schott, in whose honor it has been named.

SYNONYMICAL NOTE.

Symphylus deplanatus Blatchley, 1926 (nec Herrich-Schaeffer) is *Symphylus caribbeanus* Kirkaldy.

A NEW AND UNUSUAL INSECT RECORD FOR NORTH AMERICA (DIPTERA—DEUTEROPHLEBIIDAE).

By R. A. Muttkowski, Ph.D., University of Detroit, Mich.

Among the great variety of fascinating catches made by the writer in Yellowstone Park during the summer of 1921 an insect larva collected on July 30th occupied first place. The specimen was taken in a plankton net which had been anchored in the Yellowstone just above Cooke City bridge in the northeastern section of the park. The catch yielded a number of insect larvae, chiefly in fragments, rock diatoms, and some plankton carried by the river from Yellowstone Lake. Among this miscellany was a tiny larva, a trifle over a millimeter in length, possessing seven pairs of prolegs, long biramous antennae, and a distinct and free head.

Until recently this specimen constituted a puzzle to the writer. In fact, it is frankly admitted that at the time of its capture I was unable to recognize even the order to which the larva might belong. Biramous antennae are possessed by some Dipterous larvae, such as the subfamily Tanypinae of the Chironomidae. But the whole habitus of the specimen was so different from most of the Dipterous larvae known to me that I questioned its being a Dipteron. It seemed more like one of the Microtrichoptera which so often have fantastic and adventurous shapes. Further, the free head was unlike most Diptera.

Because of the smallness of the specimen, a little over 1 mm., and the difficulty of preserving it safely under field conditions, I decided to photograph it. This was accomplished by means of a field microscope and a long-bellowsed camera. Of half a dozen exposures that shown in the illustration was most successful. It is perhaps fortunate that the specimen was photographed, since a week later, when demonstrating it to Dr. Charles C. Adams (now Director of the N. Y. State Museum) and Prof. Alvin G. Whitney, of Syracuse University, and Dr. Gilbert M. Smith, of Stanford University, the head was badly crushed. Still, the photograph shows all the features needed for exact identification.

The head is separate and free, the biramous antennae longer than the head, reminding one of those of Cladoceran Crustacea. Most pronounced is the slightly flattened body showing the digestive tract, and the seven pairs of pseudo-legs, broadly attached to the abdominal segments, and each with a terminal pad and several circlets of claws. The shape of the feet indicated that these serve in two ways: (a) the claws acting directly as holdfasts, and (b) the soft pads serving as suckers by appression, much like the tube-feet of star-fish, sea-urchins, and other Echinoderms. Here evidently was a highly specialized means of clinging to rocks in swift currents, affording secure fasthold together with a certain degree of mobility.

With this in mind the writer on successive days, following July 30, examined the rocks in the rapids of the Yellowstone River for similar specimens. Although adult Blepharoceridae were abundant, the larvae were always too far out in the rapids to be reached. For some reason it seemed that if found at all they should occur with the Blepharoceridae. Similar searches were tried in Lamar River and Tower Creek, where the shallower water and less powerful current permitted examination of rocks carrying Blepharoceridae larvae and pupae. In all cases search was resultless. From the small size of the larva it was evident that any specimens might readily pass through the meshes of an ordinary water net. Scrapings from rocks, the loosened scum being caught in a very fine-meshed plankton net, were also tried. But no second specimen was found.

During the following winter all available literature on aquatics was ransacked for a possible identification—without result. Later some prints were sent to Dr. O. A. Johannsen, of Cornell University. Dr. Johannsen was immediately interested and also much puzzled, but wrote that he thought it most likely a Dipterous larva. He further submitted the prints to Dr. Böving at Washington. The latter gave his opinion that it might be some beetle larva.

On December 4, 1924, Dr. Johannsen sent me a note calling attention to a recent paper by Miss Pulikowsky in the Transaction of the Entomological Society of London. Having just been released from the hospital after a severe operation and busy with teaching and later with moving and establishing myself in a new position the matter perforce had to rest for the time. But recent opportunity to examine Miss Pulikowsky's paper and comparison with the photographs of the Yellowstone River specimen prompts the publication of this record.

There can be no doubt of the identity of the larvae described by her with that from Yellowstone Park. Legs, head, mouthparts, antennae, are all as described and figured. There is a superficial difference: As appears from the photo the head of the Yellowstone specimen is far larger in proportion to the body than shown in the sketches of the Siberian specimen. The same applies to the antennae, especially to the smaller ramus, the prolegs and the anal cerci. All this is secondary, however, and may be explained on the basis that the Yellowstone specimen is immature and only a trifle over a millimeter in length while Miss P.'s figures are taken from fully grown specimens about 4 mm. long. And it is a well-known fact that in younger larvae the externals and particularly the head and appendages are disproportionately larger than in full-grown specimens.

But this identity establishes the presence of a very remarkable family of Diptera in North America, namely, the Deuterophlebiidae. The type species of this enigmatic family was first described by Edwards in 1922 from two males taken at Srinagar, Kashmir, India, near a mountain stream at an elevation of 11–12,000 feet. Miss Pulikowsky's specimens were all larvae and pupae, collected from a stream in the Altai Mts., in the Russian province of Semipalatinsk, Eastern Siberia, at an altitude of about 3,500 feet. The dates of collection are given by her as July 23 to 30. These specimens were sent to her in larval and pupal form; from this lot she succeeded in rearing one female. Eventually she published descriptions of larvae, pupae, and female adult, together with detailed anatomical data.

It is unknown if the Yellowstone species is identical with the Asiatic forms. For positive determination the adults would be needed. Dr. Johannsen, in a recent letter, says this of the original specimens from Kashmir: "The fly as described is a most peculiar one and reminds one superficially of a small, very delicately veined mayfly. Structurally, however, it is undoubtedly a close relative of the *Blepharoceridae*."

The general facts pertaining to the larva, pupa, and adult are summarized by Miss Pulikowsky in the following words (p. 60):

"As to the proximity which Mr. Edwards supposes as existing between Deuterophlebiidae and Blepharoceridae I can say but as follows: If we compare the larvae of *Deuterophlebia* with the Blepharocerid larva a considerable difference can be remarked. The head and the thoracal segments are not united to a cephalothorax; there are no ventral suckers. The larvae are supplied with large leg-like abdominal appendages. The mouthparts and antennae are quite different structures in both forms. The similarity of the pupae can be treated as a convergence, provoked by identical physical conditions of existence. Indeed, the Psychodid pupa of *Maurina* (Fritz Müller) living together with the larva of *Curupira* in streams takes the shape of a Blepharocerid pupa. The ' secondary venation ' produced by the folding of the imaginal wing within the pupal case is, too, a remarkable adaptation of the species of this family, as in the Blepharoceridae and Simulidae. Other imaginal characters, as the absence of ocelli and mouthparts, six-jointed antennae, sharply differentiate the new family from Blepharoceridae. So the family Deuterophlebiidae may be referred to the suborder *Orthorapha Nematocera,* where it occupies an isolated position."

In going over my collections and notes I find some additional items which may be relevant. During the afternoon of July 10 I collected what I then called " very small Blepharocerid pupae " from a sluice dam in Lost Creek, just above Camp Roosevelt in Yellowstone Park. " Where the water beats hardest, the pupae occur. No larvae noticed, no adults seen " (notes of July 10). A *Bibiocephala comstocki* adult was taken at the same point. Although it was very difficult to gather the specimens through the splashing current, fragments of seven or eight pupae were gathered.

Another very small pupa, scarcely 4 mm. in length, and probably belonging to *Deuterophlebia,* was taken from Tower Creek on August 2. Although the pupae of the Blepharoceridae taken in Yellowstone Park (*Bibiocephala grandis* and *comstocki*) vary somewhat in size, their average is more than double that of these smaller pupae taken, namely, from eight to eleven millimeters. The pupae from Lost Creek and Tower Creek are a scant 4 mm. or less in length. If they belong to *Deuterophlebia,* three records would be established for Yellowstone Park:

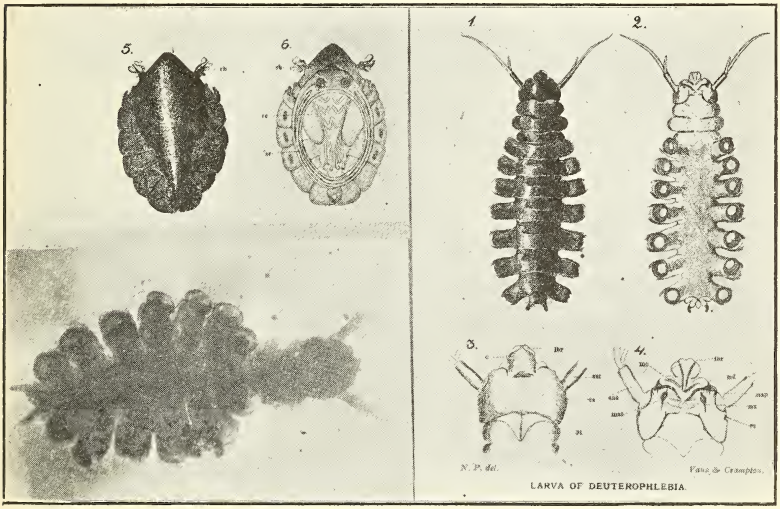
July 10. Lost Creek, above Camp Roosevelt. Seven to eight pupae. Elevation 6,300 ft.

July 30. Yellowstone River, at Cooke City bridge. One immature larva. Elevation 5,900 ft.

August 2. Tower Creek, about four miles above Tower Falls. One pupa and fragment of another. Elevation 6,700 ft.

The Yellowstone Park record establishes a third locality for this unique family of Diptera. The altitudes, though widely separated, permit a conjecture as to the possible distribution of the genus. The Kashmir record in India noted 11–12,000 feet, the

Altai Mountain record listed 3,500 feet, while the Yellowstone Park records vary from 5,900–6,700 feet. The farther north, the lower the altitude—a fact which accords with other data as regards distribution of animals and plants. From the altitudes noted I would judge that the species belongs to the subarctic life zone or at least to the Canadian zone of distribution. Dr. Charles C. Adams, who viewed the specimen in Yellowstone Park, makes the following comment: "That this insect is found in Asia and Western United States, is paralleled by many animals—the Dipper or Ousel, the butterfly Parnassius, etc."



Figs. 1–6 from Miss Pulikowsky's illustrations. 1–4, larva of Deuterophlebia; 5–6, pupa. Last figure from Yellowstone Park specimen.

I wish to express my sincere appreciation to Dr. A. O. Johannsen for his aid and interest in bringing about the determination of the Yellowstone specimen.

Edwards, F. W. *Deuterophlebia mirabilis,* a remarkable Dipterous insect from Kashmir. Ann. & Mag. Nat. Hist., IX, p. ~~39.~~ 379 1922.

Pulikowsky, N. Metamorphosis of *Deuterophlebia* sp. (Diptera-Deuterophlebiidae Edw.). Trans. Ent. Soc. London, parts i and ii for August 30, 1924, pp. 25–63, pls. IV–VI and five text figures.

A NEW NOTONECTA FROM MEXICO—(HEMIPTERA—NOTONECTIDAE).

By H. B. Hungerford, Dept. of Entomology, University of Kansas, Lawrence.

The following species belongs to the group of Notonectas so common in the western hemisphere and characterized by *Notonect undulata* Say, *Notonecta howardii* Bueno, *Notonecta indica* Linn., etc.

Notonecta indicoidea n. sp.

Size: 11 mm. long; width of head 2.9 mm.; greatest width of thorax 3.9 mm.

Color: General facies dark—much like dark forms of *Notonecta howardii* Bueno. Head, anterior half of pronotum, and limbs yellow. Rear half of pronotum darkened by the black mesonotum beneath. Scutellum entirely black. Hemelytra black, save two oblique tan streaks near base of corium, and clavus and tip of membrane which are pale. Venter black save margin of abdomen.

Structural characteristics: Head and eyes not prominent.

Vertex: Synthlipsis :: 12 : 5. Lateral margin of pronotum slightly convex and explanate. Mesotrochanter rounded. The genital capsule plump—the keel almost digitate. The lobes broadly rounded, but sharply angulate at the anterodorsal angle, clasper shaped a little like that of *Notonecta indica* Linn. but much broader.

Described from a single male from Federal District, Mexico.

Notes: Readily distinguished from *Notonecta howardii* Bueno, which in color and size it somewhat resembles by the less prominent head and the shape of the lateral margin of the pronotum. The eyes are farther apart at synthlipsis.

Catopsilia philea at Asbury Park, N. J.—A fine, male specimen of this prince of the great sulphur butterflies was observed displaying itself along the beach at Asbury Park, N. J., on the afternoon of September 9. Another straggler of this tropical species was seen on Riverside Drive, New York City, several years ago, but such occurrences are few and far between so far north.—Geo. P. Engelhardt, Brooklyn Museum.

COLLECTING AT MOBILE, ALABAMA.

By George P. Engelhardt, Brooklyn Museum.

Recollections of a visit with my friends, Loeding and Van Aller, several years ago had left too vivid an impression of good collecting to resist the temptation of a stopover when I reached Mobile, Alabama, in the early morning of May 21 on my way to the Pacific Coast. Dr. Van Aller quickly responded to the telephone by calling for me in his roadster; and then picking up Mr. Loeding at his nursery in the suburbs of the city we headed for Dog River, one of their favorite collecting places. Open savannas among yellow pine and scrub oak, wet depressions overgrown with sedges, mallows and pitcher-plants and swamp bordered hammocks of live oak, sour wood and chinquapin offer opportunities for varied collecting. Flowers were out in profusion, tiger lilies, bonesets, shooting star, verbenas, Jersey tea, orchids and many other kinds, some unknown to me. To find myself transported into mid-summer amongst flowers and life teeming in every direction just after leaving a belated spring in the East certainly was a pleasant experience.

For Loeding there was waiting a harvest of beetles on the blossoms of Jersey tea and chinquapin, while Van Aller and I were on the lookout for my special hobby, the clear-wing moths (Aegeriidae), not neglecting, however, to net an occasional specimen from among the multitude of other insects hovering about. What an opportunity for the collector of Odonata, Hymenoptera and Diptera! Cicadas were in full song high up in the trees and only a few within striking distance could be gathered in for the collection of William T. Davis. Our first clearwing, captured with the idea that it was a large queen of the orange-yellow wasp, *Vespa carolina,* did not disclose its identity as *Paranthrena palmi* until within the cyanide jar. Its mimicry of this wasp is so perfect that it defies detection while at large. We were fortunate in capturing another specimen soon after. It is a new record for Alabama. We found the breeding places of this moth on the branches and canes of live and water oaks and also on black-jack and red oaks. It requires two years to reach maturity. During the first year the larva lives under the bark, causing a blister-like swelling; during the second year it bores into the solid wood for an inch or more and pupates within this gallery in the spring.

Van Aller, no doubt, will turn up more specimens of this rare moth hereafter.

The clearwing we were most anxious to obtain was *Synanthedon rubrofascia,* a small, orange-banded species, dissimilar in the sexes, the male with black bordered, transparent primaries, the female with primaries entirely black. Frank M. Jones, of Wilmington, Delaware, was the first to make this discovery by capturing a pair in copulation in South Georgia. We, or rather Van Aller, was fortunate enough to collect five specimens, two males and three females, one pair also in copulation. We spent hours hunting for its foodplant, but failed completely. It is a most perplexing task to work up the life histories of some of these creatures when all clues as to their foodplants are lacking. A small series of another species, *Synanthedon decipiens,* recently bred from woody galls on oaks, Van Aller was good enough to turn over to me.

The next day field activities were moved to Chickasaw, along a railroad track cutting through a cypress swamp and after that to a dry sandy ridge with pines and oaks. A fine lot of Hesperid butterflies and beetles stand out among the captures of that day, but no clearwings. The best we could do was to locate plants attacked by some species of clearwings not due to hatch until fall. Another hurried visit to Dog River was spoiled by squally weather. However, I felt well repaid by the results of our previous outings, rendered ever so much more enjoyable in the company of such royal good fellows as Loeding and Van Aller.

A partial list of our captures includes the following: Coleoptera: *Trichius delta* and *vividalus,* both green and blue forms; *Trichius texanus* and *bibens, Trichodes apivorus, Clerus lunatus, Griburius equestris, Leptura rubrica* and *vagrans, Typocerus brunneus* and *lunatus, Oberea gracilis* and *bimaculata,* all collected on the flowers of ceanothus. *Curius dentatus* under bark of red maple; *Leptura abdominalis* on flowers of chinquapin; *Oedionychis petaurista* and *indigoptera* on *Calicarpa americana; Graphisurus nodosus* and *Liopus variegatus.* Lepidoptera: A list of the general run of butterflies and moths observed or collected will not be attempted in this brief narrative. May certainly is a good month for the collector of Lepidoptera in southern Alabama. We saw the larvae of *Citheronia regalis* and of other Saturnids and caught a fine luna moth, which Mr. Loeding wanted for a young naturalist friend. In the woods *Catocalas* were constantly fluttering away from their resting places on tree trunks. Here also we encountered a form of the butterfly genus Enodia, of which the writer had submitted a series to Dr. Skinner not long before his death. In his reply he expressed the belief that this form represented Huebner's *Enodia andromacha,* which can be readily distinguished from the eastern species *E. portlandia* by its larger size and broader markings, although it is carried as a synonym of that species in our check lists. Holland's butterfly book, plate 18, figures 18 and 19, illustrates both sexes of *E. creola.* The female, figure 19, certainly corresponds in every detail with what we regard as the female of *E. andromache.* The male, figure 18, differs by the " elongated patches of dark raised scales upon the fore wings," however, as it is represented only by the unique type example and as dozens of *E. andromache* of both sexes have been collected all the way from Cape Henry, Va., to the type locality in the Gulf regions of Mississippi, there is a good reason to regard the male of *E. creola* Skinner as an aberration of *E. andromache* Huebner.

A lot of Orthoptera and Hemiptera still awaits determination by some of our specialists. Among Neuropterous insects may be mentioned *Neuroptynx appendiculatus* and the beautiful large ant-lion with spotted hyaline wings, *Glenurus gratus.*

A Breeding Record of the Clerid Beetle Cymatodera balteata Le Conte.—A number of stem cuttings of the mistletoe, *Phoradendron flavescens,* growing upon the branches of large Mesquite trees near San Antonio, Texas, were collected in late May because of the numerous pupal shells of a clear-wing moth (Aegeriidae) which were protruding from them and in the hope that some of the moths might not have completed their final development. However they had and when some weeks later the stems were examined again the only living thing discovered was a rather active, small beetle larva, somewhat hairy and with good-sized mandibles, inhabiting a gallery made by one of the lepidopterous borers. Left undisturbed nothing happened until October 16 when a dead beetle, determined by Mr. Chas. Schaeffer as *Cymatodera balteata,* was found on the bottom of the glass-breeding jar. This beetle is not uncommon locally in regions of southwestern Texas, but this observation appears to be the first clue regarding its habits during the larval stages.—G. P. ENGELHARDT, Brooklyn, N. Y.

AN OBSERVED USE OF THE FORCEPS OF THE EARWIG, ANISOLABRIS ANNULIPES (LUCAS).[1]

(Dermaptera—Forficulidae.)

By John C. Pallister, The Cleveland Museum of Natural History.

While collecting in and around Mobile, Alabama, during the last two weeks of June, 1927, I had the opportunity of making some observations on the use of the forceps by the Ring-legged Earwig, *Anisolabris annulipes* (Lucas). I have not been able to find any recorded observations on the habits of this species. Bennett[2] has, however, recorded somewhat similar habits for *Anisolabris maritima* (Gene).

Taking advantage of an otherwise useless doodad, I would visit on suitable evenings the lights on the pillars erected at the entrances to allotment projects. One of these development entrances consisted of concrete domes supported by walls and pillars over a cement floor. In the center of each dome was a strong electric light with a frosted globe.

Coleoptera and Lepidoptera gathered here in numbers, circling the light or resting on the walls. Dead or dazed specimens fell to the floor, where it was easy to observe them become the victims of carnivorous and scavenger insects. *Tetracha virginica* and *carolina* were collected here in abundance.

Among the hunting insects were numerous specimens, males and females, of the earwig *Anisolabris annulipes*. They were allured to all parts of the floor, from the surrounding grass and vegetation, by the abundance of food. If the intended prey was alive the earwig approached cautiously until within an inch of it, then making a little rush, seized the victim with its mandibles and at the same time by bending its abdomen over, and usually slightly to one side of its head, used its forceps to seize, pinch, and mangle the prey until it was dead. Moths with a spread of an inch and a half would be killed. Beetles of a half inch or less would be successfully attacked.

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[1] Contribution No. 2. From the Department of Entomology, The Cleveland Museum of Natural History.

[2] Bennett, C. B. Psyche, 1904, Vol. XI, 47–53.

Dead insects were approached in the same manner as the living insects, but were usually seized only by the mandibles. The earwig would usually begin to feed immediately the insect was seized, the forceps being used to hold the food, whenever the insect was too light to stay in a fixed position. Dead beetles of large size were fed upon. In and around the mangled remains of a *Copris carolina* beetle I found two earwigs, several Histeridae, and a couple of dozen ants all busily feeding together.

Several times I found earwigs carrying or dragging their victims off to a secluded place. If the prey was small or light it was held by the forceps and elevated off the ground over the earwig's back and thence carried bodily off the field. If the prey was too large to carry, it was held by the forceps while the earwig dragged it away. Once I saw a dead June-beetle being dragged away in this manner.

Anisolabris annulipes is very common in the more elevated and dryer regions about Mobile, Alabama. I collected no specimens on or near the beach of the gulf or bay. Specimens were occasionally found under loose bark or dead trees, or about old houses or sheds wherever cover was available. I found that insects I had collected and left exposed drying, preparatory to packing, would entice the earwigs from their retreats. Under logs or beams that had been lying on the ground for some time I would frequently find five or six earwigs. Many of these were females and had excavated chambers which would probably have been used as egg nurseries within a few days.

BIOLOGICAL NOTES ON PHYMATA EROSA SUBSP. FASCIATA (GRAY) (PHYMATIDAE, HEMIPTERA).

By Philip A. Readio, Dept. of Entomology, University of Kansas, Lawrence, Kans.

While this insect is a common one, and the subject of many observations, yet little of a definite nature has been published on the details of its life and habits. This paper attempts to supply some of the needed information on this subject.

Systematic Position: Phymata erosa appears in Linnaeus' *Systema Naturae* (1), tenth edition, 1758, described as *Cimex erosa.* The insect has also been referred at various times to the genera *Acanthia, Syrtis* and *Discomerus.* The subspecies *fasciatus* was described by Gray (2) in 1832 as *Syrtis fasciatus.* In 1897 Handlirsch (14) monographed the family Phymatidae, and at that time designated *Phymata erosa* as an American species exclusively, with *fasciata* Gray as one of the sixteen subspecies. Van Duzee, in his Catalogue of Hemiptera (17), lists *fasciata* as one of the seven subspecies of *erosa* found in America north of Mexico. Several authors, since Handlirsch, have considered *fasciata* to be of specific rank, but I prefer to follow Van Duzee in this.

Previous Work: There have been a good many references to the habits of this insect. The more extensive discussions of the insect have been contributed by Cook (8) and Lintner (12) and are reviewed here.

Cook discusses this insect under the title, " Another Bee Enemy." He refers first to the previous observations of Packard (3), Walsh (4), Glover (6), Uhler (7) and Lintner. Then follow a description, with discussion of the more outstanding structural peculiarities, discussion of habits, and a " verdict " as to its economic status. The segments of the grasping front legs of the insect are incorrectly homologized by Cook. What he considers to be the femur is in reality the distal part of the coxa, while he considers the small basal portion of the coxa alone as constituting that segment; the small trochanter is considered as the tibia, the greatly enlarged femur mistaken for the tarsus, and the curved tibia for the claw. Evidently Cook did not see the true tarsus which is small, two-segmented, and contained, when not in use, in a groove on the median surface of the tibia. He speaks of the ambushing habits of this bug, and says that it destroys plant lice, caterpillars, beetles, butterflies, moths, bees and wasps. He also reports that the insect will bite humans if handled, referring to it as the " stinging bug."

Lintner (12) gives a complete summary of what has been published concerning the habits of the insect, referring to the contributions mentioned by Cook, and in addition to articles appearing after Cook's paper by Duvall, Riley (10) and Barnard (9). However, his paper adds very little to what had been previously known concerning *Phymata erosa* (Linnaeus).

Handlirsch (14) discusses the biology of the family in general, but not of this species, in his monograph of the Phymatidae. He homologizes the parts of the front leg correctly, figures and describes eggs dissected from the abdomen of a European species, and describes the nymphs of several species.

Fletcher (15) has reported the finding of the eggs of subspecies *wolffii* of this species on limbs of trees in the winter, and describes the eggs briefly.

Heidemann (16) has described the egg of *Phymata erosa* subspecies *fasciata* (Gray), and in addition compares the eggs of the Phymatidae with those of the Reduviidae.

Habitat: Because of its limitations in regard to locomotion this insect, commonly called the ambush bug, must take a position in some place which insects frequent. It is usual, therefore, to find it in or near flowers, or in leaf axils, usually somewhat hidden, either by position, or by its protective coloration, from its prey. It has been taken from golden-rod, roses, milkweed, apple, and many other flowers. It is quite likely that it will conceal itself in any flower which at any particular season is being visited by insects. Its abundance on golden-rod in the fall has been noticed quite frequently and has been ascribed to the similarity in coloration of the insect and the flower. The irregular outline of the insect, indicated in the name " *erosa,*" may also be a factor in the " camouflage " of the insect.

The nymphs are not observed as frequently as are the adults. The writer has swept numbers of them from grass and alfalfa plants, and has seen a fifth instar nymph on the upper surface of a leaf of rag-weed, apparently awaiting the approach of some insect.

Feeding Habits: The ambush bug is a predacious insect, but, being unfitted for chasing and pouncing upon its prey, must wait for its food to come to it. Although winged as an adult, and capable of flight, it uses its wings only to get from one plant to another. Its legs are short and incapable of furnishing it with rapid locomotion. Its front legs, while very strong and stout, are not capable of reaching out to any appreciable extent to grasp prey. Its method, then, is to take a position in a flower, to wait until the intended prey is very close to the body, to grab quickly with the strong front legs, and to poison the prey as quickly as possible by inserting the stylets of the beak and injecting the poisonous saliva. The prey is quickly quieted and feeding may proceed without interruption.

Under natural conditions flies and bees serve more often for food than any other insects, since they are the most abundant of the insects frequenting flowers. Small bees are taken as food quite often, and the honey bee is also fed upon. Quite a variety of other insects, as has been indicated earlier, have been recorded as the prey of this insect. The writer found that the adults would feed on house flies imprisoned in their cages. The nymphs were fed smaller flies, and other small insects, such as leaf-hoppers, plant lice, small beetles, etc. It is probable that they will attack almost any insect of suitable size.

Seasonal Life History: There is some question concerning the seasonal life history of this insect. It is usually most abundant in the fall of the year, when numerous adult individuals may be found on such fall flowers as golden-rod, feeding and mating. It is also not unusual to take adults on fruit bloom in the spring, and mating pairs have been observed at this season. The writer has collected adults in the fall, obtained eggs from the females, but has been unable to get any of the eggs to hatch, either during the fall or the following spring. One female, however, was collected as a fifth instar nymph during early June, molted to the adult, was mated to a male caught as an adult, deposited an egg mass late in June which hatched in two weeks, giving rise to a generation which matured in late August. This single record would seem to indicate that there are two generations a year, with the insects hibernating as adults. It is likely, then, that the adults taken in the spring are of the same generation as those so numerous on golden-rod in the fall. However, the evidence is so meager that it is not wise to generalize.

Eggs (*Figs. 1 and 2*): The eggs are deposited in masses, one layer deep, attached to stems and limbs. The individual eggs are embedded in a frothy mass of spittle-like material, and expose only the circular cap and upper portion of the shell. Heidemann (15) has described the egg as follows:

"Egg, oval and stout; length 1.6 mm., covered with a sticky secretion nearly up to neck; apical cap present, very thin and flat; outer surface of the chorion coarsely granulated, color black; chorial processes form numerous small channels on the chorion inside the rim."

Heidemann also makes the following remarks concerning the eggs of the family in general: "Eggs of the family Phymatidae are evidently closely related to those of the Reduviidae. They have the same peculiar chorial processes which are attached to the inner side of the egg-rim, instead of standing free upon the outside."

The number of eggs to a mass varies from 3 or 4 to over 20, and the average is closer to the higher number. The number of masses, and the total number of eggs deposited by a single female, have not been determined. The act of oviposition has not been witnessed by the writer.

Hatching: In the hatching process the cap is pushed upward slowly, first being tilted from one side, and a white, glistening embryonic membrane is seen. The insect gradually works its way out through the opening, and when part way out, the membrane is seen to break. The nymph continues to free itself from both the membrane and the egg shell, and it may now be seen that the head is bent down against the under side of the body, and that the lateral margins of the abdomen are folded together above the median portion of the abdomen. When the insect is finally free, the skin of the post-natal molt is left attached to the empty shell. The total length of time necessary for hatching, from the time of the first lifting of the cap to completion, is about three minutes. The newly hatched insect is white in color and the lateral margins of the abdomen are elevated.

Length of Stages: Only three individuals of this species have been reared through from adult to adult. The records of these are as follows:

A fifth instar nymph was collected on June 13. This individual was confined and fed, and on June 17 changed to the adult. A male, collected as an adult, was introduced into the cage and the two were seen to mate several times. The female produced an egg mass of twenty-three eggs on June 27, and died three days later. The eggs hatched on July 10, and three individuals were reared to maturity. The first molted to the second instar on July 21, to the third instar on July 29, to the fourth instar on August 5, to the fifth instar on August 13, and to the adult on August 29. This gives a total of 50 days for nymphal development, and 11 days, 8 days, 7 days, 8 days and 16 days as the lengths of the five nymphal stages in order. The second individual to mature molted to the second instar on July 23, to the third on August 1, to the fourth on August 6, to the fifth on August 15, and to the adult on August 30, requiring 51 days for nymphal development, and 13, 9, 5, 9, and 15 days for the five nymphal stages in order. The third individual molted on July 23, July 29, August 7, August 16, and August 9, requiring 55 days for nymphal development, and 13, 6, 9, 9, and 18 days for the individual stages in order. As has been mentioned before, it is probable that the generation reared was the second generation, the adults from which the eggs were obtained representing the first generation.

DESCRIPTION OF INSTARS.

First Instar (*Fig. 3*)*:* Length 1.68 mm.; length of fourth antennal segment .2 mm. Color whitish, with median region of abdomen slightly darker after ingestion of food, eyes reddish. Short and broad; head short and broad with two diverging, spine-like processes on anterior margin, and two spine-like processes on each lateral margin above eyes; beak short, stout, curved, three-segmented; antennae short, four-segmented, first segment shortest, fourth swollen, fusiform; thorax and abdomen wider than head, lateral margins expanded and bearing spinous projections as follows: Two lateral projections on prothorax, one on mesothorax, one on metathorax, and one on each of first three segments of abdomen; structure of legs as in adult, tarsi two-segmented; abdomen broadly rounded behind, lateral margins elevated in newly hatched individuals, expanded horizontally in full-fed individuals.

Second Instar (*Fig. 4*)*:* Length 2.46 mm.; length of apical antennal segment .29 mm. Color as in preceding, with under side of abdomen darker. Head armed as in preceding, with anterior projections comparatively shorter, broader, less spine-like; lateral margin of prothorax armed with two, and lateral margins of meso- and metathorax and of first three abdominal segments each armed with a single angular projection, giving serrate appearance to margin. Openings of dorsal stink glands visible at anterior margins of abdominal segments 4 and 5; abdomen nearly flat above, convex below.

Third Instar (*Fig. 5*)*:* Length 3.17 mm.; length of fourth antennal segment .4 mm. Color dirty whitish, eyes reddish, openings to dorsal stink glands faintly indicated by fuscous, darker color of ingested food visible through walls of abdomen. Head short and broad, narrower before the eyes, with two anterior dorsal spinous projections, and a prominent forked spine on either side above and behind the eyes, with a smaller spine above and before the eyes; thorax and abdomen much wider than head, lateral margins expanded; pronotum with two pairs of spines along anterior margin, the more lateral at the antero-lateral angles, and the extreme lateral portion of the pronotum produced and angled; meso- and metanota and first three abdominal segments also angled laterally; no trace of distinct wing pads in this instar.

Fourth Instar (*Fig. 6*)*:* Length 5.22 mm.; length of fourth antennal segment .61 mm. Color slightly darker than preceding, dirty whitish with greenish tinge, sometimes reddish in region of dorsal stink gland openings, eyes reddish. Head somewhat longer and more slender than in preceding, anterior projections of head more rounded, granulate; each lateral margin of head provided with two double spines, one above and before, the other above and behind the eyes; pronotum broadly expanded, margins elevated in some instances, spinous and granulate along antero-lateral and lateral margins; mesonotum wider than pronotum, rounded laterally, extended posteriorly into wing pads; metanotum shorter and narrower than mesonotum, rounded laterally; abdomen broad, rounded posteriorly, segments 1–3 angled postero-laterally; openings to dorsal stink glands visible on anterior margins of segments four and five.

Fifth Instar (*Fig. 7*)*:* Length 7 mm.; length of fourth antennal segment .86 mm. Color as in fourth instar, though decidedly darker just previous to molting to adult. Head much as in preceding, with lateral projections comparatively shorter and less spine-like; pronotum slightly elevated laterally, lateral margins finely serrate, with three more distinct angles; wing pads of both meso- and metathorax well developed, extended caudo-laterally, apices somewhat elevated, their longitudinal axes forming angle of 90 degrees with longitudinal axis of body, metathoracic pads almost concealed by mesothoracic pads; abdomen gradually widened to apex of fourth abdominal segment, from here narrowed to form rounded posterior margin; openings to dorsal stink glands visible at anterior margins of segments four and five of abdomen.

Note: These observations and rearings were made during the summer of 1926, at the insectary of the University of Kansas, Lawrence, Kansas.

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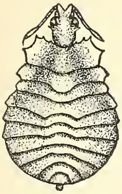
EXPLANATION OF PLATE.

Phymata erosa subspecies *fasciata* (Gray).

1. Egg mass.
2. Individual egg.
3. First nymphal instar.
4. Second nymphal instar.
5. Third nymphal instar.
6. Fourth nymphal instar.
7. Fifth nymphal instar.
8. Adult female.
9. Front leg—inner surface.
10. Front leg—outer surface.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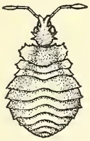
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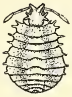
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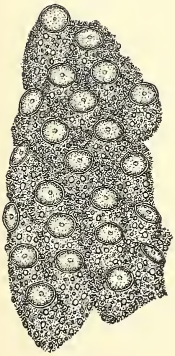
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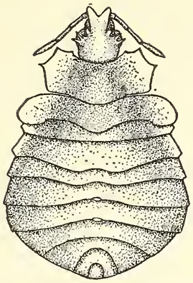
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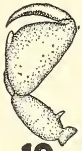
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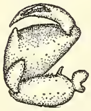
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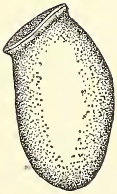
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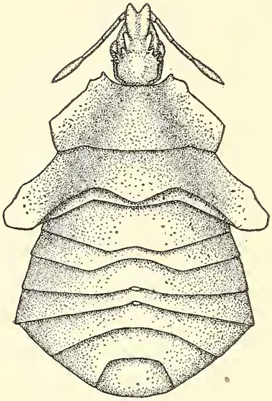
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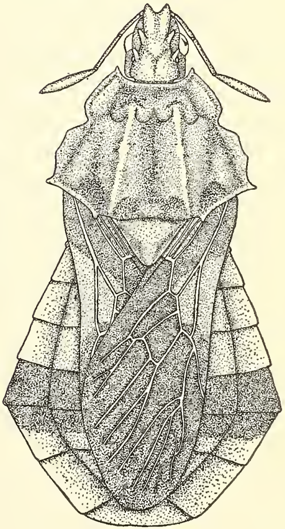
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BIOLOGICAL NOTES ON OSMODERMA WITH A NEW SPECIES OF PTILIIDAE FROM ITS PUPAL CASE (COLEOPTERA).[1]

By Harvey L. Sweetman and Melville H. Hatch.

Little seems to be known concerning the habits and life-history of *Osmoderma eremicola* Knoch. Harrington (Ann. Rep. Ent. Soc. Ont., XIV, 1883, p. 44) in Ontario found pupae in hickory and concluded that the larvae had been injurious to the tree.

Fourteen larvae of this species were taken by the senior author in their pupal cells, made up of bits of decaying wood, in a native cottonwood tree (*Populus*) on April 16, 1924, at Ames, Iowa. An examination of the trunk showed that the larval borings remained at least one-half inch from the living tissue, so that no direct injury had been done to the host. The larvae in their pupal cases were brought into the laboratory, where they underwent metamorphosis. In three cases observed the pupal period lasted about sixteen days. The last three adults to emerge had a few predaceous mites on them, which Mr. H. E. Ewing determines as belonging to the family Gamasidae. Among the cast skins in these pupal cases were a number of minute beetles belonging to the family Ptiliidae, which are described as new below by the junior author.

The adults were kept in cages containing decayed wood. Flowers, chiefly dandelion and *Spiraea,* were fed to them daily. They ignored the foliage of several species of trees. The data on the adults is tabulated in the following table. (See page 265.)

The eggs were more or less spherical, opaque, and white. Their diameter at the time of oviposition was about one-eighth inch and about twice this at the time of hatching. They were laid in the wetter portions of the wood and hatched in from 7 to 16 days, averaging 12 days. The young larvae usually ate the remains of the egg shortly after hatching, then fed upon the surrounding material. No grubs were reared to maturity but one was nearly full grown when lost after feeding continuously for about eighteen months. Allowing for periods of hibernation outdoors, this indi-

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[1] A contribution from the Department of Entomology and the Department of Zoölogy of the University of Minnesota.

Length of Life and Oviposition of Adults.

♀ No.	Pre-laying period in days	Laying period in days	Post-laying period in days	Life of ♀ in days	No. of eggs	First eggs	Last eggs	Life of ♂ in days
1	21	26	17	64	42	June 16	July 11	27
2	21	53	0	74	64	June 16	Aug. 7	25
3	33	23	0	56	25	July 7	July 29	46
4	26	5	0	31	19	July 6	July 10	46
5	29	16	10	65	49	July 9	July 24	48
Aver.	26	24.6	5.4	58	38.8			38.4

cates a three-year cycle for the species, which may be summarized as follows:

Adults	Eggs	Larvae	Pupae
May–Aug.	June–Aug.	July to May	May–June
25–74 days	7–16 days	3(?) years later	16 days

Nephanes rugulodorsus n. sp. Length .55–.60 mm.; width .25 mm. Throughout brownish, shining. Sculpture of dorsum nearly the same throughout, consisting of sparsely situated punctures each giving rise to a pale hair, the hairs arranged in more or less distinct longitudinal series. Between the punctures the surface is rugulose. Eyes prominent. Pronotum about 60 per cent. as long as wide, widest at middle; hind angles rounded, obtuse, indistinct. Elytra together at base about 70 per cent. as wide as long; truncate. Abdomen moderately prolonged beyond end of elytra. Type and 17 paratypes: Ames, Iowa. 1059. vi–3–1924. H. L. Sweetman. Cocoons of *Osmoderma eremicola* K.

Type in collection of junior author; 3 paratypes in collection of senior author; 3 paratypes in collection of University of Minnesota; 1 paratype in collection of Deutsches Entomologisches Museum.

This species corresponds closely in general appearance to Matthews's figure of *N. laevisculus* Matth. (Ann. Mag. N. H. (3) 17, 1866, pl. V, fig. 12), but differs from it by its smaller size and absence of umbilicated foveae from head and pronotum. It is slightly larger than *N. flaviventris* Motsch. and lacks its pronotal tubercles. From *N. titan* Newm. it is distinguished by its much more sparsely punctate dorsum.

The opportunity is taken to record the following notes on Ptiliidae taken by the junior author in Decatur, Ill., in 1925, which add to our knowledge of the distribution and habitat of some of the species. On March 25, from 4 to 5 P. M., there was quite a flight of Coleoptera. The immediate proximity of a freshly manured lawn may or may not be significant. On April 15, additional specimens were secured from carrion, the bait being some meat scraps that had been left out for three days in a tin can. On May 8 and 10, specimens were secured sweeping herbage. In the following notes previously recorded distribution and habitat records are indicated and the additional data brought forth by the present note is italicized.

Ptenidium pusillum Gyll. A common species. N. Africa, Europe, Caucasus, Persia, N. Y., N. J., Penn., Md., D. C., Can., Mich., Ind., *Ill.* Decaying vegetable matter, sifting leaves, dung, on fungi under boards, mole and shrew nests, decaying fungi, sweeping vegetation, *flying over manured lawn, carrion.*

Acratrichis parallela Mots. D. C., Mich., *Ill.* *Carrion.*

A. vicina Matth. *Ill.,* B. C., Cent. Am. *Flying over manured lawn.*

A. abrupta Hald. N. Y., *Ill.* In box of decaying fungi, *flying over manured lawn.* This is the *Acratrichis* sp. as well as the *Acratrichis sericans* of the junior author's list of Coleoptera of Cranberry Lake, N. Y. (Tech. Pub. 17, N. Y. S. C. For., vol. 24, pp. 287–288, 1924).

A. dohrnii Matth. N. Y., Mich., *Ill.* *Flying over manured lawn, carrion.*

A. haldemani Lec. The commonest American species of the genus. Conn., N. Y., N. J., D. C., Mich., Ind., *Ill.,* ? Colo. Sifting leaves and sphagnum moss, sweeping, in box of decaying fungi, *flying over manured lawn, sweeping.*

NOTES ON "HETEROPTERA OR TRUE BUGS OF EASTERN NORTH AMERICA."[1]

By W. L. McAtee, Washington, D. C.

For the most part previous notices of this work have been perfunctory. Their uncritical character is well shown by the fact that none of them mentioned the serious errors in the work which have been pointed out[2] by Dr. H. H. Knight (some twenty in the family Miridae) and by Mr. H. G. Barber.[3]

The writer thinks that critical discussion of the work should be continued by specialists in different groups, so that its true value may be more nearly realized. In the first line of the introduction the author refers to the work as a manual, yet he includes in it the original descriptions of 33 new species or varieties, and introduces various controversial and critical matters, all of which have no legitimate place in a manual. By the same token these things have no place in a work "prepared mainly for the use of the tyro" (p. 5), nor do such other features as the proposal of new names of tribes, and even of higher groups.

Stress is laid upon simplicity of language used in the work, but it is a strained simplicity that rejects such definite and readily learned terms as sternite and tergite, and uses such other at least equally difficult ones as thamnophilous, hygrophilous, etc. Regardless of whether the book was especially made for the tyro it is certain that on account of the prevalence of errors the tyro is the very one who cannot safely use it. On the other hand, the experienced systematist who can see for himself some of the pitfalls it contains and have an ever-present consciousness of the probable occurrence of others will often find the compilation convenient. The tyro who would have to accept things at face value would in many instances be led far astray.

Page to page comment occurring to the writer follow:

(P. 6). "I was able to study undoubted correctly named specimens." This statement is possible only from one who believes in the fixity of species and in the infallibility of systematists. It must be said, however, that systematic entomology has not yet reached this stage of precision; for instance, recent studies of Thyreocorinae have developed that 3 of the 13 species treated by Blatchley have been misidentified by nearly all authors, as they are by him. Revisionary studies no doubt will reveal similar situations in numerous other groups. Science is approximate, not exact, knowledge and nowhere is the state of flux more evident than in taxonomy.

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[1] Blatchley, W. S., 1116 pp., xii pls., 215 figs.

[2] Bul. Brooklyn Ent. Soc. 22, No. 2, April, 1927, pp. 98–105.

[3] Bul. Brooklyn Ent. Soc. 22, No. 5, Dec., 1927, pp. 241–244.

(P. 6). The footnote (No. 6) is one of the things the omission of which would have improved this book. It does not tell the whole story, and undoubtedly the non-cooperators had what seemed to themselves satisfactory reasons for their attitude. They are identified just as certainly as if mentioned by name, and a criticism against them is on permanent record; if they do not choose to give equal publicity to replies, misapprehension will be lodged in many minds. *A priori,* what legitimate expectation can a compiler have that 27, or any other given number of specialists will freely cooperate to enable him to produce a work on a subject in their field? Common sense answers " None." Since in this particular case several of the specialists solicited had previously announced that they had in preparation a similar work, the degree of cooperation given Blatchley is simply miraculous. He should have been so thankful for the general and generous assistance that no thought would have arisen of publishing such querulous footnotes as disfigure pages 6 and 1062.

(P. 6). " The classification and sequence followed in this work represent my own opinions and not those of any previous author." This grandiose statement is unjustified as the sequence followed is, with slight exceptions, that of the Van Duzee Catalogue (see Blatchley's, page 661), a compromise of the various systems proposed by leading Hemipterists whom Blatchley is pleased to call "closet naturalists." In defense of field naturalists he avers that environment produces " minor changes in structure and color." Even so, but these things have nothing to do with major classification.

(P. 7). " I have raised to family or subfamily rank a number of groups formerly regarded as subfamilies or tribes." Avoidance of such unnecessary innovations in a manual might have partially obscured the necessary conclusion that the author is essentially a provincial entomologist. Study of the world fauna always indicates the desirability of decreasing rather than of increasing the number of the higher categories of classification.

(P. 7). "A genus should be based on certain definite and fixed structures and once so founded all species then or thereafter assigned to that genus should possess those structures." The correct statement is, that a genus is based on a genotype and includes all species deemed by a given authority as properly associable with it. The original definition may fail to mention any of the characters which later study of additional species proves to really link up the assemblage. The characters ultimately proving of generic importance may not have even been seen by the original author, so how could he have based it on "certain definite and fixed structures"? Besides "fixed structures" scarcely exist among insects and there is no such entity as a "set of generic characters."

(Pp. 7–8). Despite the remarks at this point, trinomials in the body of the work are mostly not marked so as to indicate whether the form is regarded as a variety or as a subspecies. These two categories are all that are needed to cover the six mentioned by Blatchley, and it is easy to write *Alpha beta* var. *delta* or *Alpha beta* subsp. *gamma,* and not leave in doubt what status the form is considered to have. Omitting the trinomial for the typical form is illogical, and misleading to the tyro, as he invariably gets the idea that a species and its variants are distinct things, not the true one that all of the latter together make up the former. He also imbibes the notion that the form with only two names is in some way of superior rank to those with three, whereas under this usage it is on just the same footing. Trinomials properly used have a teaching value in pointing out the composite nature of certain species, and the correlation of certain variations with range, educational features of which the postulated tyro audience should not be deprived.

(P. 8). "In many cases I have not recognized the so-called geographical races or color varieties of recent authors. . . . intermediates are almost sure to be found and there is little use and often much resulting confusion in giving or recognizing a name for each slightly variable form." This comment shows complete misconception of taxonomic recognition of geographical races and color varieties. Of course intermediates occur; if they did not the forms would be recognized by specific not sub-specific designations.[4] In opposing the recognition of geographical races the author is setting himself against the almost universal practice of American systematists in ornithology and mammalogy, fields in which taxonomy in general is much more highly developed than it is in entomology.

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[4] For a full discussion of this matter see Ent. News, 31, 1920, pp. 46–55 and 61–65.

(P. 8). "To name numerous color varieties based upon the variation of the amount of fuscous or red of the pronotum or elytra, as has been done in *Paracalocoris,* and other genera, is nonsense." This is personal opinion merely and is opposed both in theory and in practice by persons having as much standing as hemipterists as its author. The joke of it is—or is it a sorrow?—that Blatchley himself has participated in this nonsensical business in naming *Paracalocoris novellus,* which turned out to be a synonym.

Seriously, however, the beginning of knowledge of noteworthy variants is when they are formally described and given a name. Then others will know definitely what the author of the name has, and will be able to collate their own notes and specimens. The history of taxonomic entomology is replete with examples of forms first recognized as varieties, and later elevated to specific rank. Even if this never happens the value of having names under which observations on the variants can be segregated is great, and as stated, it is only by the aid of names that knowledge of these forms and what they signify will accumulate.

(P. 12). "The bug is an animal which has no inner skeleton . . . whatever." The tentorium at least is an exception to this dictum.

(P. 13). "Chitin itself is insoluble." Shades of Javelle and Labarraque! (See any microscopist's vade-mecum for methods of dissolving chitin.)

(P. 18). "This osteole is the external orifice of the stink gland, and through it is emitted *at the will of the bug* a liquid or vapor . . ." The italicized words form a speculation which should have an interrogation mark appended.

(P. 18). The scutellum is treated as if it were not part of one of the primary segments of the thorax; it is a sclerite of the metathorax.

(P. 18). The description of the fore-wings of Heteroptera differs but little from the conventional and very erroneous one. See later remarks on page 21.

(P. 19). In Fig. 3, the hog-louse is included among bugs although is not so treated in the text of the manual, nor by entomologists in general nowadays. (This is a borrowed cut.)

(P. 21). Metabola should be Holometabola; see Heterometabola four lines lower.

P. 21). The definition of Heteroptera and the criteria for separating them as a distinct order from Homoptera are no more satisfactory than previous attempts. Most Homoptera have the front wings more horny than the hind ones. The Flatoidinae in general have the wings flat in repose, more so than some Heteroptera; *e.g.,* Notonectidae; and all of the gibbous groups as Thyreocorinae, Canopinae, Megaridinae, various Schizopterinae, etc. The apical portion is not more membranous than the basal one in Enicocephalinae (see Blatchley, p. 502, "elytra wholly membranous"), in Ploiariinae (see Blatchley, p. 511, "elytra . . . of uniform texture throughout"), in Piesmidae (p. 447), Tingitidae (p. 448), in various smaller groups, and in brachypterous forms of divers families. On the other hand, numerous Cicadidae have the basal part of the forewing thickened and definitely marked off from the thinner apical portion; the genus *Clastoptera* of the Cercopidae has as genuine a membrane as many of the Heteroptera. Moreover, a definition based chiefly on wings cannot be satisfactory in a group in which brachyptery is prevalent, and absence of all wings occasional, the latter being the only condition in which bugs of an entire family, the Termitaphididae are known. The head is just as much deflexed in certain Heteroptera, *e.g.,* Schizopterinae, Peloridiidae, Corixidae, Notonectidae, etc., as it is in the average Homoptera.

The structure of the beak unites Homoptera and Heteroptera in a definite unit readily separable on that character from all of the other orders of insects. No one has yet advanced adequate morphological reasons for separating these two groups as orders; and certainly no new data is brought forward in the manual.

(P. 23). "The male mounts the back of the female as in the Coleoptera." The copulatory position is uniform neither in Coleoptera nor in Heteroptera.

(P. 23). Ostiolar secretion. "In the family Pentatomidae or 'stink-bugs' and Coreidae or squash-bugs, it is, however, notorious and offensive. Birds . . . soon learn to avoid the bugs which excrete this odor." (See similar sentences lower down on page 23 and in second paragraph on page 24.) This is the old anthropomorphic, unreasoned, and unverified statement about birds avoiding nasty bugs. It is almost wholly without foundation and the two families mentioned contribute importantly to the food of most of the larger insectivorous birds.

(P. 24). Naurocoridae presumably intended for Naucoridae.

(P. 32). The exception in foot-note (no. 13) to the general statement that antennae of Pentatomoideae are 5-segmented, must mean specimens, not species, of *Corimelaena* and *Amnestus.* The short second segment is demonstrable in any bugs of these genera except in abnormal individuals in which the second and third may actually be fused in one or even in both antennae.

(P. 32). Paragraph e. "Front legs not raptorial." Are they not just as much so in certain Lygaeidae included here as they are in many Reduviidae the alternative group?

(P. 33). The statements about beak here and at paragraph cc, p. 34, should read *apparently 3-segmented.* When beaks of these groups are cleared in potassium hydroxide and carefully examined the extra segment at base can readily be distinguished. At this writing the reviewer has just re-examined cleared specimens of *Mesovelia mulsanti, Salda ligata, Cimex lectularius,* and *Hydrometra martini,* representing as many different families. All have 4-segmented, not 3-segmented, beaks as usually stated.

(P. 34). First footnote (No. 15) endeavoring to point out an error in McAtee and Malloch on Cryptostemmatidae is itself in error. Blatchley did not observe that the statement he quotes from page 2 of that revision applies to the subfamily Cryptostemmatinae, not the family, and naturally does not agree with the definition on page 3 of the contrasted subfamily, Schizopterinae. He has the matter straight in his key on page 647.

(P. 34). "The members of this superfamily all agree in possessing 5-jointed antennae." This does not apply to some exotic forms, and does not agree with his own footnote on page 32, although that itself is erroneous. See first comment on page 32.

(P. 34). Scutellum U-shaped; a poor simile; the exposure of the abdomen beyond the periphery of the scutellum is more truly U-shaped.

(P. 34). Miroideae is selected in preference to Cimicoideae apparently because the Miridae are more prevalent and more "typical" (see footnote 16). Why then is Scutelleroideae given preference to Pentatomoideae? In passing it may be noted that this spelling is not in agreement with that customarily used by entomologists for superfamily names in which the ending is -oidea.

(P. 34). While the number of families into which Heteroptera should be divided is a matter of opinion, adoption of any writer's proposals in this respect will depend upon the showing of reasonability he can make for his scheme. In subdividing his Scutelleroideae, Blatchley relegates Acanthosominae to subfamily rank while it has more distinctive characters than he cites for separating Podopidae from Scutelleridae. It is evident from inspection that the characters used in his primary division of the Scutelleroideae are relative or subject to exceptions and not at all the sort of characters that should set off such important taxonomic segregates as families. The statement "opaque part of corium much narrowed toward apex" is not true of certain Threocorids (*Euryscytus*) which is nevertheless covers in this key.

The Pentatomid segregates differ from each other chiefly by relative characters or by varying combinations of characters and can very well be treated as a single family.

(P. 36). Scutelleridae. "These . . . appear to be nowhere common in this country." *Homaemus parvulus* and *Eurygaster alternata,* at least, are locally common.

(Pp. 36–37). The subfamilies of Scutelleridae are suppressed, just the opposite tendency to that manifested in the superfamily key.

(P. 50). Describes a new variety from outside of his region in a footnote (no. 20).

(P. 53). Gives Graphosomatinae as a synonym of his Podopidae, but the genus *Graphosoma* has none of the superficial characters he gives in paragraph cc on Podopidae in his key to families on page 35.

(P. 58). The apex of the head is not rounded in all Thyreocorids; it is truncate in many and rather acute in a few.

(P. 58). "Our North American species are . . . placed in three genera. . . . Since the genus Corimelaena (White, 1839) is the oldest of these, it serves as the basis for the family names as above used." This is another instance of provincial entomology. It is certainly a new departure in taxonomy to vary the family name on geographical grounds. The oldest genus in this group is *Thyreocoris* Schrank, 1801.

(P. 58). "The family has by Van Duzee and recent authors been combined with the Cydnidae, but the characters separating the two are sharper and more distinct than those separating the Scutelleridae and Pentatomidae. Moreover the habits of the two groups are very different . . ." Since Corimelaenidae and Scutelleridae are placed together in one of his primary divisions of Scutelleroideae and Cydnidae and Pentatomidae in the opposed division, they are separated by the same characters and it is difficult to perceive any excuse for commenting on differential values in the two cases. The argument, however, is very good support for our contention (5th paragraph of comment on page 34) that the families of Pentatomids of this manual are not well grounded. The habits of the two groups from the imperfect knowledge we have of them are not very different; Corimelaenids as well as Cydnids are to be found about plant roots especially in sandy soil, *Cydnoides* being habitual burrowers. On the other hand, *Sehirus* of the Cydnids occurs commonly on foliage of plants of the mint family. Moreover, habits have nothing to do with classification. Permitting them to have weight in this connection is reversion to the ancient practice which placed whales among the fishes.

(P. 60). Blatchley says *Cydnoides renormatus* is known only from Colorado and Illinois; Arizona can be added.

(P. 65). Paragraph a. " reflexed narrow side margins of pronotum obsolete before reaching the polished nodulose hind angles. 28. anthracina." There is no contrast in this character between this and other species of the genus treated here.

(P. 66). Blatchley errs with most authors in applying the name *lateralis* Fabricius to a species not agreeing at all with the original description. Fabricius says " Body smooth, black, shining, elytra alone white; a broad black vitta which scarcely attains apex." This description certainly does not apply to a form in which the elytra are black, narrowly edged with whitish. More probably *lateralis* is a prior name for *pulicaria* Germar.

(P. 68). Blatchley says (footnote) that in Uhler's original description of *Corimelaena minuta* there is no character that " distinguishes it from *marginella* as here recognized." Another case of hurried reading. Uhler says " upper surface densely, minutely, roughly punctate all over," which certainly is not true of *marginella,* and he says of elytra " orange, with a narrow, black, slightly waved line near the interior margin." Blatchley says *marginella* has the costal border pale, not widened at base. It is the same error as in the case of *lateralis*; one form has a pale elytron with dark vitta, the other a dark elytron with pale vitta. These of course are only gross color characters. There are excellent structural characters to distinguish *minuta,* a species so distinct as to be easily recognizable by the unaided eyes. *C. minuta* as Blatchley says is so far unknown from the United States.

(P. 118). It may be desirable to treat *Thyanta accerra* McAtee as a district species, but it certainly is not a variety of *calceata* as suggested; in scutellar characters it resembles *custator.*

(Pp. 159–160). Under *Nezara viridula,* nothing is said of the striking variety *torquata* Fabricius, known from various southern states.

(P. 208). The characters advanced for separation of the coreid bugs into families are either weak or subject to exceptions and are not at all of the type required for definition of satisfactory groups of the family rank. The classification of the pentatomids, coreids and other Hemiptera Trichophora could have been much improved if the trichobothrial characters had been taken into account. Important papers on these have been published by Alb. Tullgren (Ent. Tidskr., 39, 1918, pp. 113–133) and J. R. Malloch (Bul. Brooklyn Ent. Soc., 16, 1921, pp. 54–56).

(P. 210). "The two species [of *Merocoris*] are easy to separate when one has specimens of both in hand, but quite difficult from the literature extant." A key using the principal character advanced by Blatchley was published by the reviewer in Bul. Brooklyn Ent. Soc., 14, 1919, p. 15, where the forms are recognized as subspecies, a treatment the data given by Blatchley by no means render undesirable.

(P. 222). *Leptoglossus magnoliae* Heid. was not based on a Florida specimen as stated; the type locality is Washington, D. C. (see Proc. Ent. Soc. Wash., XII, 1910, p. 192), although Heidemann had material also from Florida, Georgia, and North Carolina.

(P. 229). Says *Mozena obesa* Mont. is not recorded from outside of Florida. H. G. Barber has published (Journ. N. Y. Ent. Soc., 34, 1926, p. 211) Mississippi, Kansas, and Nebraska records in a paper referred to in other connections by Blatchley.

(P. 241). "Two species [of *Chelinidea*] are known." This ignores Hamlin's two species published in Proc. Royal Soc. Queensland, 35, 1923, and included in a key in Ann. Ent. Soc. Am., 17, 1924, p. 195. The proper name for the eastern form is *Chelinidea vittiger* subspecies *aequoris* McAtee. As to the quadrinomial name for varieties, if subspecies have them the only recourse in naming them is quadrinomials.

(P. 263). "McAtee (1919, 8) says that about Washington, D. C., the nymphs occur only on *Ceanothus americanus.*" This is inexact; McAtee said "I have not found the nymphs upon any other plants," which is quite a different thing.

(P. 337). "Heteroptid" a highly original but undesirable contraction.

(P. 354). The "closely allied Lygaeid" mentioned belongs in a distinct subfamily.

(P. 365). A manuscript name of H. G. Barber is here published in such a way that Blatchley will be authority for the species.

(P. 376). "Van Duzee, following McAtee, has made this a variety of *bullatus,* but if form of body, and texture and sculpture of elytra count for anything in taxonomy, it is a distinct species." The form in question is *discopterus* Stål which is nearly always brachypterous. In brachypterous forms of hemiptera "the form of body, and texture and sculpture of elytra" may be very greatly changed from what they are in macropterous examples, hence Blatchley's remark instead of being an incisive criticism (as phrased) is simply another manifestation of narrow view.

(P. 401). Footnote 51. "Quaintance (Bull. 42, p. 564, Florida Exp. Station) under the name of *P. vincta* Say, records *O. basalis* as injurious to strawberries at Lake City and calls it 'The Strawberry Pamera.' His figure and notes under description show plainly that he had at hand *O. basalis,* not *vincta.*" The fact is Quaintance had neither *vincta,* nor *basalis,* but in reality *bilobata* Say. Size alone will serve to distinguish these three species, as shown by the measurements Blatchley himself gives. Quaintance had the largest form and his figure showing a dark bar across costal area behind middle runs in Blatchley's own key to a group including only *bilobata* and another species which no one as yet has endeavored to bring into this particular case. The reviewer has several times received *bilobata* with the report that it was damaging strawberries.

(P. 419). The Plummers Island, Maryland, record for *Tempyra biguttula* Stål is cited merely as an illustration of what occurs throughout the book, omission of the names of collectors. Where it is desirable to give credit for collecting a rare insect it certainly should be to the actual collector rather than to the owner of the collection from which it was seen.

(P. 433). A manuscript name of H. G. Barber is here published in such a way that Blatchley will be authority for the species.

(P. 444). *Dysdercus obscuratus* Dist. A definite record for the United States is published in Ent. News, 37, 1926, p. 14.

(P. 447). Does not mention the peculiar cavities on under side of the thorax among characters of the family Piesmidae.

(P. 447). "Of the ten nominal species [of *Piesma*] recognized by McAtee." Despite the implication of this remark, these species are no more nominal than others; what is evident is that Blatchley hasn't seen them.

(P. 451). The name Tinginae for a subfamily does not accord with Tingididae which he uses for the family.

(P. 470). *Leptobyrsa rhododendri* Horváth (*explanata* Heid.) certainly is not "an introduced European species" as stated. This remark may be true for the preceding species *Stephanitis pyrioides* Scott in connection with which nothing of the kind is said.

(P. 499). The locality name Marsh Hall should be Marshall Hall.

(P. 513). Footnote 62. There is no conflict between the two statements quoted from McAtee and Malloch, though an effort is made to have it appear that there is.

(P. 514). Notes that *Stenolemus pristinus* McAtee and Malloch is a synonym of *S. longicornis* Blatchley, but he says nothing of his obtaining this priority by sending to the press[5] a description so poorly prepared that this species was included in a genus *Malacopus* Stål described from Brazil, with which it has nothing to do. The revised generic description presented by Blatchley, therefore, is futile.

(P. 521). "Moreover, an astute observer like Say would not have overlooked the prominent tubercle on the basal margin of pronotum." Blatchley removes the name *errabunda* Say from one tuberculate species (*tuberculatus* Banks) and places it on another (*parshleyi* Bergroth). In Bergroth's key *errabunda* and *parshleyi* fall in different sections according to absence or presence of a median tubercle on base of pronotum. Perhaps neither Blatchley, nor McAtee and Malloch, but Bergroth had the real *errabunda*. Since agreement on the identity of *errabunda* seems unlikely, and no type is extant, it may be best to drop this name and use *tuberculatus* Banks, and *parshleyi* Bergroth, the type specimens of which are extant.

(P. 523). Blatchley gives his conclusion that *Empicoris vagabundus* L. and *E. pilosus* Fieb. are very distinct species, but no adequate reasons for it. Both are European forms, that have been commonly regarded as varieties of a single species, a practice that requires no change due to any data brought forward in the manual.

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[5] Ent. News, 36, 1925, pp. 45–46.

(P. 529). "The above is the brief original description of this form" (*Emesaya lineata* McAtee and Malloch). This would imply that the description quoted was the total original description, which it decidedly is not. There are more than 50 words of description of structural characters in the parts of the key relating to *lineata,* which must be considered as part of the original description. This is a method of description adopted for economy in preparation, in printing, and in reading, one which Blatchley says (p. 5) he uses himself, but of which he has complained in correspondence, and by implication criticizes in the extract quoted.

(P. 532). "The genus *Barce* not being represented in America." The genus *Barce* was first validated by description of a species from Wisconsin; it is a synonym of *Metapterus* Costa, the name used by McAtee and Malloch.

(P. 536). Beak said to be 3-jointed, but figure shows either a 4-segmented beak or a 2-segmented head! (A borrowed illustration.)

(P. 540). *Oncerotrachelus.* "Two species are known, one from Grenada, the other from our territory." In reality four species are known, two of them from the United States. See Ann. Ent. Soc. Am., 16, 1923, pp. 249–250.

(P. 554). *Triatoma ambigua* Neiva placed as a variety of *T. sanguisuga* Lec. is a different species that has been redescribed as *T. pintoi* (Larrousse, Ann. Parasitol., 4, 1926, pp. 138–139).

(P. 601). *Nabis brevis* Scholtz. "On nursery stock imported from England." There is no more reason for including this than many other imported bugs. If we listed all of those intercepted by inspectors of the Federal Horticultural Board our catalogs would grow very rapidly.

(P. 620). The phrases, "pronotum always present," and "meso- and meta-sterna separated by a distinct suture," in the definition of Miroidea, refer to facts so obvious that one is at a loss to account for their inclusion here. They would fit just as well in a definition of the whole suborder. Possibly these are mistakes in paraphrasing from the definitions of the superfamily by other authors; if attempt is made in the second to clarify

Reuter's term "sternum composite," failure has resulted as the "suture" Reuter had in mind in this connection is not the usual transverse suture between body segments, but a longitudinal pseudo-suture.

(Pp. 620–621). The key to families of Miroidea fails to take into account pertinent publications, especially those of McAtee and Malloch, on Annectant Bugs (Bul. Brooklyn Ent. Soc., 19, No. 3, June, 1924, pp. 69–82, pl. I; 21, Nos. 1–2, April, 1926, pp. 43–47, and Proc. Biol. Soc. Wash., 38, pp. 145–147, pl. IV, Nov., 1925). Paragraph a. "Ocelli present" is not in order since in one of the included families, Cryptostemmatidae, ocelli are often absent. Paragraph b. "Tarsi 3-jointed," similarly does not apply, because those of American Isometopidae at least are 2-segmented. Paragraph c. "Beak 3-jointed." This point needs reinvestigation throughout the Heteroptera and while the reviewer does not pretend to complete knowledge for the Miroidea, it is probable from results already obtained that the beak is fundamentally the same in all the families and that it is 4-segmented. Paragraph dd. "Macropterous forms only known." The Crypostemmatidae to which this remark is applied have numerous brachypterous forms.

(P. 649). "The description of *C. niger* Uhler (1904, 361) from New Mexico agrees in all particulars with that of *vagans* M. & M., but they state that the type of *niger* is lost and so described the species as new." This is a misleading statement of the facts. Uhler compares *niger* with his "*brasiliensis* Reuter," which was the same as Uhler's *latipennis,* a species McAtee and Malloch keep separate from *vagans* in their treatment. Manifestly, therefore, the description could not agree in all particulars with that of *vagans,* nor in actuality does it so agree. McAtee and Malloch state that "The name *Ceratocombus niger* Uhler may possibly have been applied to specimens of this widely distributed species" and discuss the lost type and damaged paratype. Theirs is a fair statement of the matter, Blatchley's is not.

(P. 657). The Bergrothian view of the generic distinctness of *Teratodia* Bergroth from *Diphleps* Bergroth is adopted, ignoring McAtee and Malloch's second contribution (Bul. Brooklyn Ent. Soc., 21, pp. 46–47, April, 1926) to the subject, in which they state that the type specimens were submitted to several American hemipterists, who agreed that the two so-called genera were but sexes of the same species.

(P. 658). The generic name *Mallochiola* Bergroth used by Blatchley for *Idiotropus gagates* McAtee and Malloch probably is unnecessary. Examination of *tenella* Zett with which Fieber's species were synonymous shows that *gagates* M. & M. differs from it only in relative characters, not in definite structural details. *Idiotropus* Fieber is made a synonym of *Myrmedobia* Baerensprung by some authors.

(Pp. 660–964). See comment by Dr. H. H. Knight (Bul. Brooklyn Ent. Soc., 22, No. 2, April, 1927, pp. 90–105) to which I have only the following two notes to add:

(P. 698). "McAtee (1916, 386) has named the pale form var. *ablutus,* though Reuter expressly states that the general color of the typical form is 'pallide flavo-testaceus leviter nitidulus.'" McAtee's reason was possession of type material from Aurora, W. Va.; if the holotype, probably in Helsingfors, does not support the action, well and good. On available knowledge, however, in view of the "type system" the action taken was justifiable.

(P. 880). "As pointed out by McAtee and Malloch (1924, 71), *Peritropis* is an aberrant genus in that the tarsi are 2-jointed instead of 3-jointed as in other Mirids. They regard it, therefore, as an 'annectant' or connecting link between the families Miridae and Isometopidae. The absence of ocelli and the two closed cells of membrane denote, however, that it is a true Mirid." This latter remark suggests the query, "What is a 'true Mirid?'" the reviewer's answer to which would be, "Nobody knows." There is no finality to knowledge in science, least of all in entomological taxonomy. We do not know Miridae and we do not know Isometopidae enough to define them definitely and to say whether there may or may not be numerous intergrading forms. To come to details, *Diphleps* an Isometopid has two closed cells in membrane, and 2-segmented tarsi, as in *Peritropis* the "true Mirid," besides agreeing with that genus in structures common to the Miroidea, as well as in texture and coloration. It is certainly legitimate to apply the term annectant to such a form. The genus *Mevius* of Distant described from India is a synonym of *Peritropis* and examination of a species in the British Museum revealed that it also has 2-segmented tarsi.

The defects in Blatchley's manual here pointed out are only such as are obvious to a single student of Hemiptera in the treatment of groups on which he has done some work. Other students no doubt can see additional errors, and specialists in the various families should report their findings, so that shortcomings of the book may be brought to the attention of those who use it.

The book certainly is not what its author proposed, one particularly helpful to the tyro, for only the very experienced worker can use it without getting a wrong idea of the present state of classification, and of being led astray by its numerous errors, and loose critical comment.

If the book had been frankly presented as a compilation extending its basis—the Hemiptera of Connecticut—something less than 40 per cent. (in species), if it had avoided the unwarranted flights into the higher realms of classification, and if it had omitted critical and censorial matter, it would have been far more acceptable than in its present form.

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PROCEEDINGS OF THE SOCIETY.

Meeting of January 13, 1927.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum, Eastern Parkway, Brooklyn, N. Y., on Thursday evening, January 13, 1927, at 8.26 p. m.

President Davis in the Chair and thirteen members present, *viz.:* Messrs. Anderson, Bell, Beutenmuller, Chapin, Doll, Engelhardt, Notman, Schaeffer, Schiffer, Siepmann, Sheridan, Torre-Bueno, Weeks, and one visitor, Mr. C. L. Pollard.

Minutes of the December meeting read and approved.

Mr. Engelhardt presented the annual report of the Treasurer and remarked that there were now 72 subscribers to Entomologica Americana, an increase of 15 during the past month; he also presented a comparison of the income account for the past six years and remarked on the steady and healthy growth which was shown, from an income of $1,185 in 1921, to $2,155 in 1926.

Mr. Weeks made a motion, which was seconded and approved, that the Society express its thanks to the Treasurer for the prosperous condition shown by the report.

Mr. Torre-Bueno presented the detailed report of the Publication Committee. On motion of Mr. Weeks, duly seconded and approved, the Society extended its thanks to Mr. Torre-Bueno for the fine report.

Mr. Pollard expressed his pleasure at being present, and remarked that it was the first meeting of the Society which he had attended in 15 years.

Mr. Schaeffer proposed for membership Mr. Pinney Schiffer, 20 First Avenue, New York City. Mr. Schiffer being present, Mr. Weeks moved that the By-Laws be suspended and that the Secretary cast one ballot for his election, duly seconded and carried. The Secretary then cast the ballot and Mr. Schiffer was declared elected a member of the Society.

Mr. Engelhardt called the attention of the Society to the death of Mr. George Schoonhoven, son of Dr. J. J. Schoonhoven, a member of the Society, and made a few remarks about him. It was moved and seconded, that Mr. Engelhardt write to Dr. Schoonhoven and express the regret of the Society. Mr. Engelhardt also called attention to the death of one of the subscribers to the Bulletin, Mr. George J. Keller.

Mr. Sheridan reported for the Nomination Committee and presented the following names for officers of the Society for the ensuing year: President, Mr. W. T. Davis; Vice-President, Mr. J. R. de la Torre-Bueno; Treasurer, Mr. Geo. P. Engelhardt; Publication Committee, Mr. J. R. de la Torre-Bueno, Mr. Geo. P. Engelhardt, Mr. Ernest L. Bell; Secretary, Mr. Ernest L. Bell; Corresponding Secretary, Mr. Howard Notman; Delegate to the Academy, Mr. Geo. P. Engelhardt; Librarian, Mr. R. F. Hussey; Curator, Mr. A. C. Weeks. As there were no further nominations, they were declared to be closed and, on motion, duly carried, the Secretary was directed to cast one ballot for the election of those presented by the Nomination Committee, which was accordingly done.

Mr. Weeks showed some living Tenebrionid beetles (*Tribolium confusum*) which he had obtained from a box of oatmeal that had been gnawed open by a mouse, the weevils were turned over to Mr. Schaeffer.

Mr. Davis showed a specimen of *Carabus nemoralis* Müll. which he had found on the sidewalk on Christmas day; the insect was dead when found but in perfect condition. He showed a copy of the Proceedings of the Staten Island Association of Arts and Sciences for May, 1915, in which there was an account under the title of "A Beneficial Beetle Recently Found on Staten Island," written by himself, recording his capture on May 10, 1915, of the first specimen of this beetle on Staten Island, and said that it has now become an established species there.

Mr. Notman gave an account of his collecting trip by automobile through the states of Oregon and Washington in 1923. He told of his experiences collecting at various points in these two states, especially on Mt. Rainier, where he collected at an elevation of 5,000 to 6,000 feet, and at Crater Lake, Oregon, at a somewhat higher elevation, where he found snow banks on August 4, though beetles, flies and butterflies were abundant. He reported many interesting beetles which he found along the shores of the Rogue River and also along the Snake River from Baker, Oregon, to Boise, Idaho. He illustrated his remarks with a box containing many specimens taken on his trip, which were prepared with his usual exactness and care.

Mr. Notman's remarks were discussed by the members, especially by Mr. Engelhardt, who had visited many of the localities where Mr. Notman had collected.

On motion of Mr. Sheridan, duly carried, the Society expressed to Mr. Notman its appreciation of his scholarly address.

Mr. Engelhardt exhibited a lot of clear-winged moths (Aegeriidae) recently received from O. C. Poling and collected at Alpine, Texas, during the season of 1926. Two species were represented: *Synanthedon prosopis,* bred from galls on catsclaw (Mesquite), and *Gaea palmi,* captured on the food-plant, a western composite known as burro-bush. The larvae are borers in the heavier portions of the stalks. Both of these species, heretofore, have been turned up only occasionaly in single specimens, but with their food-plants and habits known, it is now comparatively easy to collect them in numbers.

Adjourned at 10.05 p. m.

Meeting of February 10, 1927.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on February 10, 1927, at 8.19 p. m.

President Davis in the Chair and 12 members present, *viz.:* Messrs. Bell, Beutenmuller, Chapin, Engelhardt, Huntington, Notman, Schaeffer, Schiffer, Sheridan, Shoemaker, Siepmann, Torre-Bueno, also three visitors, Mr. C. L. Pollard, the speaker of the evening; Mr. Ragot, and Mr. Chas. Lemmer.

Minutes of the meeting of January 13 were read and approved.

Mr. Engelhardt presented the Treasurer's report, showing income from the previous meeting to date, amounting to $357.10; he also remarked on the steady growth of subscribers to *Entomologica Americana.*

Mr. Torre-Bueno presented the report of the Publication Committee, saying that in addition to the steady increase in subscribers to *Entomologica Americana,* several more had been secured for the Bulletin; the galley-proof for the February number of the Bulletin was in his hands and that No. 3 of *Entomologica Americana* was in the hands of the printer; he also mentioned several papers which he had on hand for future issues of *Entomologica Americana;* he also spoke generally of the problems of the editor.

Mr. Davis exhibited a box of insects, including cicadas, grasshoppers, hymenoptera and an ant-lion; he remarked briefly on them and called attention to three specimens of the lubber-grasshopper, two of which were collected by Mr. Bell in the vicinity of

Mobile, Alabama, and one from the Florida penisula, the Florida specimen was more yellowish than the Alabama specimens, one of which was very dark and the other one intermediate between it and the Florida specimen. Mr. Davis said that the Florida peninsula specimens were of a lighter or more yellowish color than those found on the continent. After the meeting Mr. Bell called his attention to the fact that the very dark form from Alabama was taken in the swampy areas, while the lighter form was taken in the dry pine woods and that Dr. van Aller had told him that still lighter ones were sometimes found in the woods.

Mr. Schaeffer showed a galley proof of part of the Coleoptera section of the New York State List of Insects.

Mr. Pollard addressed the Society on " Color in Butterflies," illustrating his remarks with two boxes of specimens, showing a wide range of color; he also spoke of the care that should be used in placing pin labels on specimens and showed a T-shaped label for the specific designation to be attached to the pin of the specimen instead of being pinned in the drawer.

A general discussion followed Mr. Pollard's address.

Adjourned at 9.50 p. m.

MEETING OF MARCH 10, 1927.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on Thursday evening, March 10, 1927, at 8.21 p. m.

President Davis in the Chair and 11 members present, also 3 visitors, including Mr. R. A. Leussler, of Omaha, Nebraska. The members present were as follows: Messrs. Anderson, Bell, Beutenmuller, Chapin, Engelhardt, Notman, Ragot, Schaeffer, Schiffer, Siepmann, Weeks.

Minutes of the previous meeting read and approved.

Mr. Engelhardt reported briefly for Mr. Torre-Bueno, the editor, who was not present.

Mr. Engelhardt proposed for membership Mr. Frederick Lemmer, 688 Nye Avenue, Irvington, New Jersey, and Mr. Bell proposed for membership Mr. C. L. Ragot, 2120 Barclay Street, Long Island City, New York.

Mr. Weeks made a motion that the By-Laws be suspended and that the members proceed with the election of the two gentlemen proposed; duly seconded and carried. He then moved that the Secretary be directed to cast one ballot for their election, which being duly seconded and carried, the Secretary thereupon cast the one ballot and Mr. Lemmer and Mr. Ragot were made members of the Society.

Mr. Engelhardt read a letter from Mr. John J. Schoonhoven, acknowledging the Society's expression of regret in his son's death.

Mr. Engelhardt showed pupae of the Lycaenid *Feniseca tarquinius* Fabricius (which he had collected among the leaves under black alders in the Botanical Gardens and remarked on the larvae and the appearance of the pupae; he also spoke of finding the pupae of one of the *Chrysopidae,* the lace-winged or golden-eye fly, among the leaves of the black alder, while looking for the pupae of *tarquinius,* and showed one adult specimen of the fly which had emerged in the jar containing the pupae of both of these species.

Mr. Davis showed samples of drawings of the genitalia of *Lachnosterna* by Mr. Sim; he also exhibited a box containing galls of *Amphibolips confluens* Harris, one of which was of peculiar shape and remarked upon them.

Mr. Beutenmuller spoke on "Collecting in North Carolina," relating his experiences collecting in the Black Mountain region several years ago; he showed several maps of the mountain ranges running from Virginia to Alabama, pointing out the general contour of the country where he collected; he showed many photographs and water-color sketches made by Mrs. Beutenmuller of the mountain scenery and places where he collected; he also exhibited a box containing specimens of *Coleoptera* collected by him in this region and many beautifully drawn pen and ink illustrations of North Carolina beetles, which were drawn by Mrs. Beutenmuller.

A general discussion of Mr. Beutenmuller's remarks followed.

Mr. Leussler spoke of Nebraska, saying that the lowest elevation in the state was in the southeastern part where it was 1,000 feet above sea level, and the highest in the northwestern part where the elevation is 6,000 feet, of the interesting sand-hill regions, the lakes and the canons with their historical interest connected with Indian battles of the past; the insect fauna of the state is of particular interest as there are found among the butterflies many species that are also taken in the east, south and Rocky Mountain regions.

Society adjourned at 10.15 p. m.

MEETING OF APRIL 14, 1927.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum, on Thursday evening, April 14, 1927, at 8.17 p. m.

President Davis in the Chair and 12 members present as follows: Messrs. Anderson, Bell, Beutenmuller, Chapin, Engelhardt, Huntington, McDevitt, Notman, Ragot, Sheridan, Siepmann and Torre-Bueno, also two visitors, Mr. Pollard and Mr. Bridwell, and a reporter.

Minutes of previous meeting read and approved.

Mr. Engelhardt presented the Treasurer's report.

Mr. Torre-Bueno reported for the Publication Committee that the April BULLETIN was made up and in the hands of the publishers, and No. 4 of the *Entomologica Americana* galley-proofs were on hand; he also said that 21 new subscribers to the BULLETIN had been obtained since January 1 and that a few had been dropped.

Mr. Bell proposed for membership Mr. Lionel Lacey and Mr. Richard Lacey, both of 107 6th Avenue, Pelham, N. Y.

The proposals were held over until the next meeting in due course.

The Secretary read a letter from Mr. Roy Waldo Miner, Recording Secretary of the New York Academy of Sciences, with regard to the increased cost of publishing the Directory of the Academy and proposing that the affiliated societies bear one-half of the cost and the Academy the other half, the pro rata share of each society to be based upon its membership, as given in the Directory of 1924, over and above those members who are also members of the New York Academy of Sciences. Mr. Engelhardt moved that the society accept the proposition as stated in the letter, duly seconded and carried.

Mr. Engelhardt proposed for Honorary Membership Mr. W. H. Nichols, Jr., and remarked on Mr. Nichols's generosity and of the great assistance he had been to the Society. Mr. Nichols was unanimously elected an Honorary Member.

Mr. Engelhardt then proposed Dr. L. O. Howard, United States Entomologist, for Honorary Membership, and he also was unanimously elected.

Mr. Davis called attention to newspaper reports of the forest fires raging on Long Island and spoke of their disastrous effect upon the vegetation and the insect and animal fauna of the regions burned over.

Mr. Engelhardt spoke of the large numbers of deer on Long Island, but said that introductions from other regions had almost completely replaced the original stock.

" Factors underlying the abundance and scarcity of insects " formed the subject of a conference freely discussed by all members present. Mr. Engelhardt, in opening the discussion, remarked that the terms " common " and " rare " so frequently used by collectors must be considered as arbitrary expressions indicating the ease or difficulty with which certain species may be collected, rather than bearing upon the actual status of insects, based on biological facts. An insect conspicuous because of size, color or habits may be designated as common, while another less conspicuous and of obscure habits may be regarded as rare, whereas in actual numbers it may exceed by far the supposedly common kind. Food unquestionably is the basic factor underlying the status of all insects.

In the scheme of nature all living organisms are subjected to a keen competition for existence. In this struggle with its complexity of interdependent relations insects are favored or retarded numerically in proportion to their powers of distribution, their adaptability regarding food and their resistance to climatic and weather conditions. As a result there may be seasons of abundance or of paucity, maintaining, however, under otherwise normal conditions an average which is popularly known as " the balance in nature."

Against this balance in nature, man's widespread activities are constantly at work. Agriculture, timber operations, city developments, routes of travel and above all his utter disregard of everything not of direct benefit to him are changing the aspect of the earth and the struggle for existence has come to a pass where adaptability to changed conditions is supreme and the lack of these qualities means doom. Innumerable examples to illustrate this assertion can be cited. What has become of the hordes of Rocky Mountain locusts that periodically devoured the farmers' crops in the West? Its natural breeding grounds on mountain meadows have been turned into pastures for cattle and sheep, and of the grasshoppers hardly enough are left to be sure of the identity of the species. In contrast may be mentioned the cotton boll weevil which, of little significance in its Central American home lands, found a table spread when it crossed the Mexican border into Texas and quickly adapted itself to the consumption of an unlimited supply of food.

Mr. Bridwell spoke of his experiences traveling in many parts of the world.

Mr. Anderson mentioned finding many parasitized pupae of *Cecropia,* but those found on bay-berry were usually in sound condition.

Adjourned 10.45 p. m.

MEETING OF MAY 12, 1927.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum, on Thursday evening, May 12, 1927, at 8.15 p. m.

President Davis in the Chair and 12 members present, as follows: Messrs. Beutenmuller, Chapin, Engelhardt, Lemmer, Ragot, Schaeffer, Schiffer, Sheridan, Shoemaker, Siepmann, Torre-Bueno and Weeks, also one visitor, Mr. Pollard.

In the absence of Secretary Bell, Mr. Pollard was asked to serve as Acting Secretary.

Minutes of the last meeting were read and approved.

The Treasurer presented his report, which was accepted and ordered placed on file.

Mr. Torre-Bueno reported for the Publication Committee.

The names of Messrs. Lionel Lacey and Richard Lacey, of Pelham, N. Y., proposed for membership at the last meeting, were laid before the Society. Upon motion, the Acting Secretary was directed to cast an affirmative ballot, and this being done, both gentlemen were declared elected.

A letter was read from Dr. L. O. Howard expressing appreciation of his election to honorary membership in the Society.

Mr. Engelhardt exhibited a pamphlet prepared by Dr. W. J. Holland in commemoration of George A. Ehrmann, a former subscriber to the Society's publications. This is illustrated with photographs of Ehrmann's types in his collection, which is now in the Pittsburgh Museum.

Upon motion, it was voted that the Society hold no further meetings until October.

Mr. Davis reported seeing a male *Papilio polyxenes* on Staten Island on May 1, remarking that *P. turnus* is usually the first of the *Papilios* to appear. Mr. Ragot reported seeing both species in several localities during the first week in May.

Mr. Davis also exhibited a map of Long Island showing the distribution of various broods of the 17-year locust, *Magicicada septemdecim.*

Mr. Beutenmuller, speaking upon the topic, "The Bombycine moths found in the Black Mountains of North Carolina," exhibited and commented upon a number of specimens. The majority of species, he said, were northern forms, very few distinctively southern species appearing. He commented on the abundance of several, as *Haploa militaris* and *Utetheisa bella.*

Mr. Engelhardt exhibited a collection of inflated larvae made by the late Josef Mattes and recently purchased by the Brooklyn Museum. It includes about 1,500 specimens of some 200 species, mostly identified and all beautifully prepared. Mr. Engelhardt read a brief memorial which will be published in the BULLETIN. (See No. 4, vol. xxii.)

Mr. Schaeffer spoke on "American Chrysomelidae." He exhibited and commented upon a number of species, stating that although only a few authors had worked upon this group, there had been considerable misidentification. The paper will be published in full in the BULLETIN. Adjourned at 10.24 p. m.

CHARLES L. POLLARD,
Acting Secretary.

MEETING OF OCTOBER 13, 1927.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum, on Thursday evening, October 13, 1927, at 8.15 p. m.

President Davis in the Chair and nine members present, as follows: Messrs. Anderson, Chapin, Engelhardt, Lemmer, Schaeffer, Schiffer, Sheridan, Siepmann and Torre-Bueno, also two visitors, Mr. C. L. Pollard and Mr. Geo. J. Rau.

In the absence of the Secretary, Mr. Pollard was appointed Acting Secretary.

Minutes of the last meeting were read and approved.

The Treasurer presented a report, which was accepted and ordered placed on file.

Mr. Torre-Bueno reported briefly for the Publication Committee, stating that Vol. VIII, No. 1 of *Entomologica Americana* had been distributed.

The Acting Secretary read a letter from Mr. W. H. Nichols, Jr., expressing appreciation of his election to honorary membership in the Society.

Mr. Engelhardt brought up the question of raising the subscription price of the BULLETIN, stating that the Publication Committee, after due consideration, recommended an increase in the price to members from 75 cents to $1.50, and in the case of subscribers from $1.50 to $2.50. Mr. Torre-Bueno explained the reasons for the proposed charge. Upon motion, duly seconded, it was voted to refer the matter to the Publication Committee with power.

The President exhibited two recently published books, " Histological Technique," by Kingsbury and Johanssen, and " Guide to the Dragon Flies of Connecticut," by Dr. Philip Gorman; also a number of picture postcards received during the summer from various members.

The scientific program was then taken up and Mr. Davis showed a male specimen of *Mantis religiosa* taken by Mr. Ned J. Burns at Sands Point, August 31, 1927. This adds a Long Island station to the range of this insect, which has been gradually spreading since its introduction into Central New York. He also exhibited various specimens of Cicadas taken in the West by Mr. Engelhardt.

Mr. Sheridan mentioned the desirable collecting in Frost Valley, south of Slide Mountain, in the Catskills.

Mr. Lemmer showed various moths taken at Lakehurst, N. J., with some inflated larvae. He stated that in sugaring for moths he had found the most successful bait to be slightly fermented apple sauce, with an admixture of cane molasses.

Mr. Chapin briefly described his experiences while collecting near Litchfield, Conn.

Mr. Engelhardt exhibited some of the so-called jumping beans from Mexico, which are really the seeds of an euphorbiaceous plant. The motion is caused by the larva of one of the Micro-Lepidoptera, *Carpocapsa saltitans.* He also gave an account of the aestivation of the larva of *Arachnis picta,* a Californian arctian moth. This account will be published in the BULLETIN. Mr. Engelhardt further reported that he had observed the butterfly, *Catopsilia Philea,* a species of the far south, at Asbury Park, N. J., in early September, stating that he had also seen it some years ago on Riverside Drive in New York City.

Mr. Schiffer remarked that he had found some interesting beetles in his collecting during the summer in this vicinity.

Mr. Siepmann said that he had collected extensively in Middlesex County, N. J., paying especial attention to the Chrysomelidae. Informal discussion followed, and at 10.15 p. m. the Society adjourned.

CHARLES L. POLLARD,
Acting Secretary.

EXCHANGES.

This one page is intended only for wants and exchanges, not for advertisements of articles for sale. Notices not exceeding THREE lines free to subscribers. Over lines charged for at 15 cents per line per insertion.

Old notices will be discontinued as space for new ones is needed.

SCOLIA AND CAMPSOMERIS wanted from all regions of world, will determine, exchange or purchase. J. C. Bradley, Cornell University, Ithaca, N. Y.

WE WISH to procure in exchange or on cash: *Parnassius of North-America,* with his varieties and aberrations, well labelled, spread or in papers (clodius, smitheus, eversmanni). Dr. Staudinger & A. Bang-Haas, Dresden-Blasewitz.

THE MUSEUM of the Brooklyn Institute has a few uncolored sets of the Calverly, Weidenmeyer and Edwards plates of North American Sphingidae for exchange or for sale at $5 per set. Address, Librarian, Brooklyn Museum, Eastern Parkway, Brooklyn, N. Y.

LEPIDOPTERA from the Mountains of Kentucky. Papilios and other var. of this section collected. Paper spec. of *Xylophanes tersa* and *Catopsilia eubule* on hand. Also Cocoons of the larger Saturnid moths. Ellis Chandlee, Barbourville, Ky.

BUTTERFLY COLLECTORS.—Have you aberrations or freak butterfly specimens for sale or exchange? Professional and private collectors please write. Jeane Gunder, Pasadena, Calif.

NEW ARRIVALS.—From Colombia, French Guiana, and Brazil. Brilliant tropical Lepidoptera for scientific and decorative purposes. H. S. Parish, 14 Briarcroft Road, Toronto, Ont., Canada.

CYNIPIDAE.—Galls and bred wasps wanted to determine or in exchange. Alfred C. Kinsey, Indiana University, Bloomington, Indiana.

WANTED.—Am studying the bionomics of the corn billbugs and desire the privilege of examining *Calendra* (*Sphenophorus*) from all parts of the world. A. F. Satterthwait, U. S. Entomological Laboratory, Webster Grove, Mo.

DIURNAL LEPIDOPTERA.—Have many desirable western species to exchange, including *Argynnis atossa, macaria, mormonia, malcolmi, nokomis; Melitaea neumoegeni; Lycaena speciosa;* etc. Send lists. Dr. John A. Comstock, Southwest Museum, 4699 Marmion Way, Los Angeles, Calif.

WANTED.—Ants from all portions of the United States for determination or exchange. Will also exchange other insects for ants. M. R. Smith, Assistant Entomologist, State Plant Board, A. and M. College, Miss.

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A SYNOPSIS OF THE AMERICAN SPECIES OF ACALYPTA (HEMIP.—TINGITIDAE).

By Carl J. Drake, Ames, Iowa.

This paper is based upon material contained in the U. S. National Museum, Calif. Academy of Science and the private collections of J. R. de la Torre-Bueno, Herbert Osborn, H. M. Parshley, G. S. Walley and the writer. The key includes nine species, three of which are described as new. The genus *Drakella* Bergroth is treated as a synonym of *Acalypta*.

Genus Acalypta Westwood, 1840.

Acalypta Westwood, Introd. Mod. Class. Ins., II, Synops., 1840, p. 121.
Orthosteira Fieber, Ent. Mon., 1844, p. 46; Europ. Hemip., 1861, pp. 36 and 130.
Acalypta Stål, Enum. Hemip., III, 1873, pp. 118 and 122; Ofvers. K. Vet.-Akad. Forh., 31, No. 3, 1874, p. 51.
Acalypta Horváth, Ann. Mus. Nat. Hung., IV, 1906, pp. 13 and 24.
Acalypta Bueno, Bul. Brookl. Ent. Soc., XIX, 1924, pp. 50 and 93.
Fenestrella Osborn and Drake, Ohio Biol. Surv., II, No. 4, 1917, p. 222.
Drakella Bergroth, Ann. Soc. Ent. Belg., LXII, 1922, p. 152.

Orthotype, Acalypta (*Tingis*) *carinata* Panz.

Form ovate to elongate ovate (brachypterous) or oblong (macropterous). Bucculae open or closed in front. Orifice indistinct. Antenniferous tubercles prominent, somewhat cone-shaped, frequently more or less compressed laterally, straight or with the tips more or less strongly curved down-

> ward and inward. Antennae moderately long, segment III not much slenderer than IV. Head with two frontal spines, the others wanting. Pronotum unicarinate or tricarinate; hood variable in size, frequently small and somewhat transverse. Paranota slightly reflexed, reticulate. Elytra with distinct costal, subcostal, discoidal and sutural areas; slightly longer than the abdomen in brachypterous form; much longer than the abdomen in macropterous form. Wings almost as long as the elytra in macropterous form; wanting or greatly reduced in brachypterous form.

The genus *Drakella* Bergroth (= *Fenestrella* O. & D.) is treated herein as a synonym of the genus *Acalypta*. The Palaearctic species of *Acalypta* having unicarinate pronotum (*A. samara* Put., *A. musci* Schrr., *A. uniseriata* Put., *A. nigrinervis* Stål, *A. brunnea* Germ., and *A. suturalis* Put.) are not generically distinct from *D. ovata* O. & D. and *D. saundersi* Downes. The elytra, head, bucculae, antennae, paranota and rostrum of *Drakella* do not differ in a generic sense from *Acalypta*. The uni- and tri-carinate pronotum are the only constant structural differences between the species belonging to the genera *Drakella* (unicarinate pronotum) and *Acalypta* (tricarinate pronotum). This synonymy agrees with Horváth's classification of the European species of *Acalypta* in "Synopsis Tingitidarum Regionis Palaearcticae," IV, 1906, p. 24. It should also be noted that the lateral carinae are not very well developed in some specimens of *A. thomsoni* Stål.

Key to the American Species of Acalpta.

1. Pronotum unicarinate, the lateral carina wanting 2
   Pronotum tricarinate 3
2. Third segment of antennae twice as long as the fourth; elytra as in fig. 1, *a* .... *D. ovata* O. & D.
   Antennae longer, third segment more than twice as long as IV, elytra different, see fig. 1, *b* .... *D. saundersi* Downes.
3. Antenniferous tubercles cone-like, not curved, directed distinctly outward and slightly downward. . *A. cooleyi* Drake.
   Antenniferous tubercles with their tips strongly curved downward and inward 4
4. Antero-lateral margins of the paranota not angulate, the two margins jointly rounded 5
   Antero-lateral margins of the paranota angulate or sub-angulate, the two margins quite distinct 7
5. Anterior margin of pronotum (hood) scarcely produced; paranota very narrow, biseriate in front, uniseriate behind, the areolae extremely small and nearly round; lateral carinae

not strongly raised, rather indistinctly areolate, discoidal area with six rows of areolate at its widest part. **A. nyctalis** n. sp.

Hood distinctly produced in front; lateral carinae strongly foliaceous, the areolae large; discoidal area long, with four rows of areolae 6

6. Hood somewhat Λ-shaped, projecting over base of head; discoidal area long and narrow .... *A. lillianis* Bueno.

Hood more roundly and slightly less produced in front; discoidal area a little more acuminate posteriorly, the carinae slightly less elevated; areolae slightly smaller; antennae slightly shorter .... *A. modesta* Parshley.

7. Median carina strongly raised anteriorly, hood projecting angulately (distinctly Λ-shaped) in front; lateral carinae low, without areolae, divaricating posteriorly; discoidal area scarcely impressed .... *A. thomsoni* Stål.

Hood transverse, sub-angulately produced in front; lateral carinae strongly foliaceous, subparallel, the areolae distinct 8

8. Antennae moderately long (seg. III = 35; IV = 17); discoidal and subcostal areas each with six (sometimes six to seven) rows of areolae, costal area irregularly biseriate on the distal portion .... **A. vanduzeei** n. sp.

Antennae slender and much shorter (seg. III = 25; IV = 12); more closely reticulated; costal area uniseriate, except at base; discoidal and subcostal area with four (sometimes here and there five) rows of areolae... **A. vandykei** n. sp.

Acalypta ovata (Osborn & Drake) (fig. 1, *a*).

Fenestrella ovata Osborn and Drake, Ohio Biol. Surv., II, No. 4, 1917, p. 223, fig. 2.

Drakella ovata Bergroth, Ann. Soc. Ent. Belg., LXII, 1922, p. 152.

Ovate, dark grayish brown. Head with two rather short, porrect, blunt, converging spines. Antenniferous tubercles prominent, their tips strongly curved downward and inward. Rostral channel slightly widening posteriorly, the rostrum reaching on the first segment of the venter. The outer nervure between subcostal and discoidal areas strongly raised and prominent. Length, 2 mm.; width, 1.35 mm.

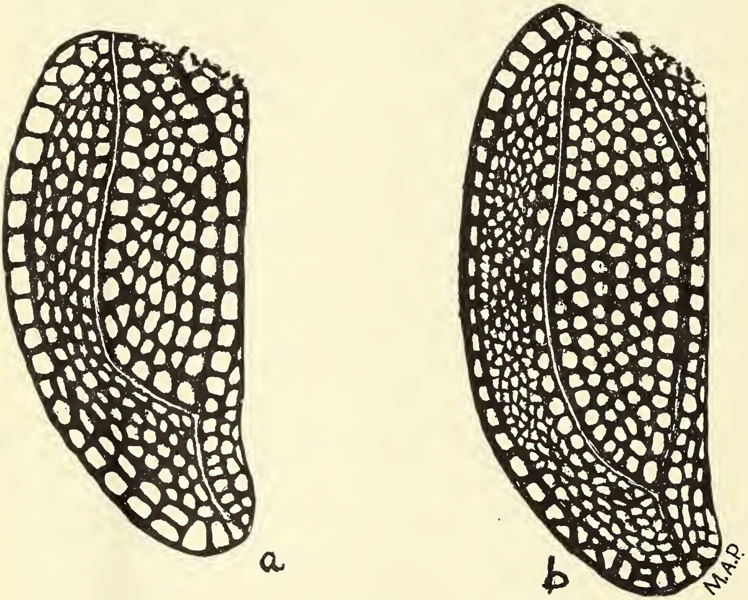
Holotype, brachypterous female, Cincinnati, Ohio, collected by Chas. Dury, in collection of Herbert Osborn. Known from the type and two other short winged females from the type locality, all taken by Mr. Dury while sifting moss and debris for beetles. The male and the macropterous form are unknown.

Acalypta saundersi (Downes) (fig. 1, *b*).

Drakella saundersi Downes, Can. Ent., IX, No. 3, 1927, p. 60.

This very distinct species may be separated from *A. ovata* (O. & D.) by the characters listed in the key and fig. 1. Reticulations more regular, smooth and polished in *ovata.* Frontal spines about as much turned down as up in *D. ovata.* Length, 2.2 mm.; width, 1.35 mm.

Known only from the *holotype,* a macropterous female, Goldstream, B. C., July 15, 1926, found among detritus washed up on the edge of a reservoir in a low marshy area by L. G. Saunders, in Canadian National collection, Ottawa, Canada. Nothing is known regarding its food or habits.



1. Left eltyron of (a) *Acalypta ovata* O. & D., and
(b) *A. saundersi* Downes.

Acalypta thomsoni Stål (fig. 2).

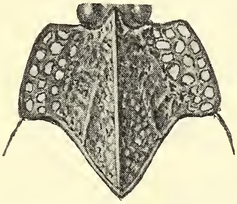
Acalypta thomsonii Stål, Enum. Hemip., III, 1873, p. 122.

Acalypta thomsoni Drake, Ann. Carn. Mus., XVI, No. 3–4, 1926, p. 377, Pl. XXXIV, fig. *d.*

Acalypta madelinae Bueno, Bul. Brook. Ent. Soc., XXI, No. 3, 1926, p. 117.

Smooth, rather shiny, brownish to dark grayish brown. Bucculae almost or contiguous in front. Segment III of antennae a little more than twice as long as IV, the latter black. Antenniferous tubercles large, somewhat compressed laterally, curved as in *A. lillianis* Bueno. Paranota broad, rectilinear, slightly variable in width. Lateral carinae low, distinctly diverging posteriorly, slightly less elevated in some specimens than in others. Median carina strongly raised anteriorly, forming a distinctly Λ-shaped hood in front. Discoidal area scarcely impressed, with five to six rows of areolae at its widest part. Costal area broad, biseriate at the base, uniseriate in front of the middle and then bi- to triseriate behind; subcostal area broader, composed of six rows of areolae.

Types, ♂ & ♀, *"Carolina meridionalis"* in Naturhistoriska Riksmuseet, Stockholm, Sweden. Specimens have been examined from Massachusetts, Virginia and Washington, D. C. Taken in sphagnum and moss at Dunnan, Va., September 28, 1925, by H. G. Barber. Hibernates as adults in moss. A detailed drawing of the pronotum of the type (Fig. 1) by Madame Thérèse Eklom, of Stockholm shows that *A. thomsoni* has been correctly determined by various American workers. *A. madelinae* Bueno is a synonym. The macropterous form is unknown.



2. Pronotum of *Acalypta thomsoni* Stål (type).

Acalypta nyctalis n. sp.

Ovate, yellowish brown. Head short, black; frontal spines short, divergent, slightly shorter than in *A. lillianis* Bueno. Antenniferous tubercles large, curved as in *A. lillianis.* Bucculae not contiguous in front. Rostrum long, reaching to the base of the abdomen. Antennae stout, segment I a little shorter than in *A. thomsoni,* the apical segment black. Pronotum coarsely pitted, tri-carinate; lateral carinae faintly diverging posteriorly, each slightly raised anteriorly, the areolae becoming distinct in front; median carina more prominent, slightly more raised anteriorly, the areolae becoming distinct and larger anteriorly. Paranota narrow, slightly reflexed, rounded, uniseriate behind, biseriate in front, the areolae small. Hood transverse, its anterior margin a little straighter than in *lillianis.*

Elytra convex, rounded behind; costal area narrow, almost entirely uniseriate (the distal third with three or four extra cells) ; subcostal area broad, with five to six rows of areolae at its widest part; areolae of subcostal, discoidal and sutural areas equal in size, but slightly smaller than those of costal area. Legs and antennae dark brown. Length, 2.6 mm.; width, 1.2 mm.

Holotype, brachypterous, female, Franconia, New Hampshire, in U. S. National Museum collection. This species has heretofore been confused with *A. lillianis* Bueno. The much narrower paranota and the character of the hood, carinae and elytra are very different from *lillianis* or allied forms.

Since writing the foregoing description, a short winged female (*paratype*) from Bilby Alta, Alberta, Canada, June 1, 1924, collected by O. Bryant, has been received. The apex of the third and the fourth antennal segments are black, IV being not quite half as long as III.

Acalypta lillianis Bueno.

Acalypta lillianis Bueno, Bul. Brook. Ent. Soc., XI, No. 2, 1916, p. 39.

Acalypta lillianis Osborn and Drake, Ohio Biol. Surv., II, No. 4, Bul. 8, 1916, p. 221, figs. 1 and 2.

Acalypta ovata Osborn and Drake, Ohio Jour. Sci., XVII, No. 1, 1916, p. 9, fig. 1 (described macropterous form of *A. lillianis* Bueno).

Acalypta grisea Heidemann, Proc. Ent. Soc. Wash., XVIII, 1917, p. 217.

Dark grayish brown to black. Antennae moderately slender, segment III three to slightly more than three times as long as IV. Bucculae open in front. Hood small, somewhat transverse, projecting sub-angulately in front. Carinae strongly foliaceous, uniseriate, the lateral ones almost parallel. Paranota rounded, biseriate, sometimes partly triseriate in front. Discoidal area long, with four rows of areolae at its widest part, a little more rounded behind than in *A. modesta* Parsh.

Brachypterous form: Length, 2.3 mm.; width, 1.2 mm.
Macropterous form: Length, 3.0 mm.; width, 1.6 mm.

Holotype (macropterous female) and *allotype* (macropterous male), White Plains, N. Y., in the collection of J. R. de la Torre-

Bueno. Morphotypes, brachypterous male and female, in the collection of Bueno. Specimens have been examined from Iowa, Illinois, Indiana, Ohio, Michigan, Pennsylvania, New Hampshire, Maine, Massachusetts, New Jersey, Washington, D. C., North Carolina, Maryland, and Ottawa and Quebec, Canada. Bueno also reports the insect from North Carolina. It has been taken in moss at White Plains, N. Y., by Bueno; the Adirondacks Mountains, N. Y., by Barber; Covey Hill, Quebec, by G. S. Walley, and at Ames, Iowa, by G. O. Hendrickson. H. G. Barber collected a long series of species under a board at Lakehurst, New Jersey. Hendrickson and Drake found nymphs and adults in low wet mossy areas in the virgin prairies near Ames, Iowa; one short-winged adult was black in color. Bueno collected numerous specimens " in a damp and marshy meadow by sweeping close to the ground where the tall tree-like moss grows in clumps." He also found nearly full-grown nymphs during November, December, March and April. Hibernating adults have been taken in Iowa in early April by Hendrickson.

The brachypterous form of *A. lillianis* shows a considerable variation in color, size and shape. The antennae also show a slight variation in length. These variations make it rather difficult to separate it from *A. modesta* Parshley.

Acalypta modesta Parshley.

Acalypta modesta Parshley, Proc. Brit. Col. Ent. Soc., No. 18, (Syst. Ser.), 1921, p. 4.

Acalypta modesta Downes, Proc. Ent. Soc. B. C., No. 23, 1927, p. 10.

Pale grayish brown, the legs and antennae darker. Paranota slightly narrower than *A. lillianis* Bueno; hood not so roundly and slightly less produced in front; carinae slightly less elevated; and the costal area a little narrower. The third segment of the antennae is also slightly shorter than in most of the specimens of *lillianis*. Discoidal area more acuminate posteriorly. The macropterous form is unknown.

Holotype, macropterous female, Royal Oak, B. C., May 14, 1917, collected under moss on rocks by R. C. Treherne, in the National collection, Ottawa, Canada. *Allotype,* macropterous male, taken with holotype, in collection of H. M. Parshley. Mr. G. S. Walley, of the Dept. of Agriculture of Canada, states that holotype is a very poor specimen, having the pronotum and hood injured and the left elytron missing. The allotype is in perfect condition, but it appears to be slightly teneral; this may account to some extent for its lighter color. The differences btween *lillianis* and *modesta* are not marked and are quite comparative, thus making them very difficult to separate in the key.

Acalypta vanduzeei n. sp.

Ovate, brown, the paranota, hood, triangular process slightly tinged with yellowish; two frontal spines rather long, porrect, slightly divaricating, brown. Bucculae not contiguous in front. Eyes dark reddish brown. Antenniferous tubercles directed obliquely downward and curved inwardly towards the tips as in *A. lillianis* Bueno. Antennae brown, moderately long and stout, clothed with numerous fine short hairs; segment I short, very stout; II very short, obconical; III slightly curved, narrowed towards the apex; IV brownish black, fusiform, the hairs longer, nearly two and a half times as long as III. Rostral canal narrow, deep, the laminae testaceous; rostrum reaching a little beyond the sternum. Legs dark brown, the tibiae a little lighter. Abdomen beneath brownish black, sometimes tinged with reddish.

Pronotum tricarinate, each carina areolate and raised anteriorly, the lateral carinae parallel. Hood a little larger and more strongly produced in front than in *A. lillianis.* Paranota irregularly triseriate, rounded on the sides, the anterior margins subtruncate. Elytra a little longer than the abdomen; costal area widely reticulated biseriate at the base and along the greater portion of the distal half; costal area very broad, with five to six rows of areolae, strongly and evenly raised towards the subcostal area; subcostal area broad, with six rows of areolae at its widest part, separated from subcostal area by a sinuate and distinctly raised nervure; the areolae of subcostal, discoidal and sutural areas about equal in size. Length, 2.1 mm.; width, 1.21 mm.

Holotype, male, Green Point Ranch, Humboldt County, Calif., June 11, 1916, F. E. Blaisdell, collector, in Calif. Academy of Science. *Allotype,* taken with holotype, in Drake collection. The paranota, hood and subcostal and discoidal areas separate this species from *A. lillianis* Bueno. The long winged form is unknown. The female is a little broader and stouter than the male.

Acalypta vandykei n. sp.

Elongate ovate, brownish. Head short, black; frontal spines moderately long, stout, blunt, porrect, brownish; the other spines wanting. Antennae slenderer than in *A. vanduzeei*; segment II short, obconical, not half as long as I;

III brown, slightly curved, slender, becoming slender towards the apex, a little more than twice as long as IV; IV black, fusiform, clothed with moderately long hairs. Antenniferous tubercles strongly curved as in *A. lillianis* Bueno. Bucculae open in front. Apex of rostrum extending a little beyond the rostral channel. Orifice absent.

Paranota narrower than in *A. vanduzeei,* the anterior margin straight; the outer margin slightly curved, triseriate in front and biseriate behind. Hood similar in form to *vanduzeei,* but slightly more elevated. Carinae more raised than in *vanduzeei.* Elytra narrower in the male than in the female; costal area narrow, uniseriate; subcostal area broad, composed of four somewhat irregular rows of areolae; discoidal area bounded by a very prominent costate nervure, widest a little behind the middle, composed of four to five rows of areolae. Long winged form unknown. Length, 1.82 mm.; width, 1 to 1.15 mm.

Holotype (male), San Francisco County, Calif., December 2, 1906, Van Dyke collector, in Calif. Academy of Science. *Allotype* (female), taken with holotype in Drake collection. The female is broader and more ovate than the male. The shape of the paranota and the more triangularly produced anterior margin of the hood separate either *A. vandykei* or *A. vanduzeei* from *A. lillianis* Bueno.

Acalypta cooleyi Drake.

Acalypta cooleyi Drake, Ohio Jour, Sci., XVII, No. 6, 1917, p. 213.

Elongate oblong, dark grayish brown. Pronotum coarsely punctate, strongly swollen through the disc. Carinae parallel, foliaceous, each composed of a single row of rather large areolae. Hood roof-shaped, projecting (Λ-shaped) angulately in front. Paranota biseriate, the outer margin nearly straight, angulate in front and sub-angulate back of the middle. Antenniferous tubercles large, prominent, straight, cone-shaped, distinctly divaricating towards their tip, also inclined slightly downward. Bucculae open in front. Discoidal area impressed, bounded by a prominent costate nervure; wings longer than the abdomen. Length, 2.9 mm.; width, 1.2 mm.

Known only from the *holotype,* macropterous female, Bozeman, Montana, June 13, 1913, Prof. R. A. Cooley collector, in Drake collection. The antenniferous tubercles separate this species from its congeners.

" QUIT-CLAIM " SPECIALISTS VS. THE MAKING OF MANUALS.

By W. S. Blatchley, Indianapolis, Ind.

" The ground work, the foundation of the whole immense entomological structure of to-day is essentially taxonomic. . . . Objects without names cannot well be talked of or written about; without descriptions they cannot be identified and such knowledge as may have accumulated regarding them is sealed. . . . In short, without the fundamental work of the taxonomist, the great mine of entomological literature would not exist; the accumulation of knowledge would be largely limited to what each person could personally observe and remember."[1]

" Entomologists clearly recognize the existence of a shortage of systematists and the necessity for supplying the demand. Can those having the power to meet this need be made to see the present difficulties of the situation and provide a living wage for each of those human beings who are willing and desirous of devoting themselves to insect taxonomy? "[2]

" Taxonomy demands the highest talent, and those who prove their fitness should have every facility and inducement."[3]

With the above quotations as a justification for the preparation of my manuals, I wish to put on record some of my experiences during the past twenty years—some of the obstacles with which I have had to contend in the work that I set out to do, and that is now practically completed. I also wish, for the first time, to answer as far as I can, some of the criticisms regarding that work. In so doing I fully realize that my critics will probably become more embittered and may exhaust their vials of gall in reply, but I long ago learned that: " Truth wears no mask; bows at no human shrine; seeks neither place nor applause; she only asks a hearing."

In 1907, realizing the great need of general works, descriptive of certain groups of insects with which I was somewhat familiar, I began the preparation for the novice or beginner of those manuals which have been put forth in the twenty years which have elapsed. In their preparation I have given free, and solely for the good of the cause, not only all my spare time but more than $12,000 of my previous earnings for their illustrating and publication. This does not include the salary of my faithful assistant, who by thirty years' training and practice, has been able to put my long-hand hieroglyphics of key and text into typewritten manuscript which the printer could use. The demand for such works as I have put forth is limited, and for that reason I am as yet more than $4,000 "to the bad" in their publication.

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[1] Gahan, A. B., Proc. Entom. Soc. Washington, XXV, 1923, 73.

[2] Editorial in Entomological News, XXXVII, 1926, 117.

[3] Aldrich, J. M., Science, April 22, 1927.

In the preparation of the first two works issued, the "Coleoptera of Indiana" (1910), and (in collaboration with Chas. W. Leng) the "Rhynchophora of N. E. America" (1916), I succeeded, without much trouble or delay,[4] in getting such aid as I requested, and when completed there was little published criticism of these works.

In those days there were fewer specialists than now who were imbued with the idea that the Good Lord had given them a "quit-claim deed" to all the species in this country belonging to their especial group, and that no one, not even the author of a manual who desired to include *all* species from the territory he was covering, had any right to "poach on their preserves." When, however, I began work on the Orthoptera of N. E. America I found that these specialists had "arrived." My experience was exactly that set forth in a recent article,[5] *viz.*, "Suppose some specialist in a museum has published many descriptions (say 500) of species in his particular group. The specialist, being a mere human, may begin to get chesty about his control of the group and, entrenched behind his 500 descriptions, may boast, 'Anyone that wants to study the Utopiidae has to come here; I've got the group so tied up they can't wiggle.'" I was unable to borrow along as I needed them a single specimen from the specialist I have in mind. Many excuses for not making the loan were given and, in addition, the following free advice was offered: "Personally I would be very chary about either preparing or attempting to publish a work on eastern U. S. Orthoptera at this time for the following reasons: (*a*) The Melanopli must be completely studied from new angles and in a number of other groups the present order or arrangement, and even recognition of forms, must be greatly modified. (*b*) The ultimate object of the field work my co-worker and myself have been doing for the last sixteen years is the preparation and publication of a work on the Orthoptera of North America which will be on the scale of Scudder's butterfly work, and which we hope to have ready in ten or fifteen years. (*c*) It would be almost impossible to get such a work published now by an institution or society, as retrenchment must be in order for the period of the war."

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[4] See p. 5 of the Coleoptera and footnote.

[5] Proc. Ent. Soc. Washington, XXVII, 1925, 185.

When this letter was received I asked myself the question—"How is the student or beginner going to name his specimens during the ten or fifteen years which must elapse before this gigantic new work by this Orthopterological combine is ready?" As there was no satisfactory answer I went ahead and prepared my manual and published it myself and am glad I did so, as ten years have since elapsed and no further notice of the intended publication of the big work of the firm has since been given.

What was the immediate result of the publication of my manual, contrary to the advice of this specialist? A four-page diatribe in Entomological News, in which there was scarcely a single sentence of approval of my work. Aside from this diatribe, the "Orthoptera," and the two preceding works, were well received by those who really needed them—*viz.*, the tyro or beginning student and the busy economic entomologist who wished some one work by which he could quickly and readily identify his specimens in hand.

When I began work on my last manual—The Heteroptera of N. E. America—I soon found out that the "quit-claim" specialists had increased in number. To one of them who is connected with a prominent museum and who, with a co-worker, had just finished some Revisions or Monographs of special groups of Heteroptera, I sent some Florida specimens for naming which belonged to those groups, but which I could not identify from his recently issued monograph, asking him to return them long enough for me to draw up descriptions from them. He returned them, three of them marked "unknown to me" or "new species." At the same time he wrote: "I think that harm is done the study every time that descriptions are published apart from present or recent synoptical work. I trust you will not send me any more under the same conditions." I, of course, did not send him others, but I described the new species, as I had to have a name for them in order to place them in my book.

This same specialist afterward published an article in which he favored the loan of type specimens from museums. As I had had trouble in borrowing even paratypes from his museum, I wrote and asked him why he could not " practice what he preached," and lend me a few specimens to help me in my work. He replied: " My paper contained my personal views, but the rules of the museum forbid the loan of types. However, I do not consider the preparation of a manual as falling within the class of work to aid which I would urge the loaning of types. Only thorough-going revisional work deserves such signal assistance."

Another one of these " quit-claim specialists, and probably the king-pin of them all, is Dr. H. H. Knight, of Ames, Iowa. He recently published[6] a caustic eight-page criticism of the " Heteroptera," especially that portion of it pertaining to the family Miridae. About the confines of this family, as represented not only in this country but in the world at large, he has attempted to construct a hog-tight, bull-proof fence and woe be unto any person who attempts to root his way under. The only line of commendation (?) of my work in Knight's article is as follows: " This book *exhibits unusual ability in the compilation of the subject-matter* [*sic*], chiefly from the 'Hemiptera of Connecticut,' but the author has also *mixed in much* new material. In so doing he has fallen into several errors."

Now the " Hemiptera of Connecticut " should be rightfully entitled the " Hemiptera of New England," for of the 750 Heteroptera treated in that book, only 354 were recorded from Connecticut. In that work 255 genera of Heteroptera were treated, the majority of them only briefly in keys, without any generic characterization whatever. In the Heteroptera of Eastern North America, 398 genera were treated, not only in keys but with a full characterization of each genus. In the Connecticut work 750 species of Heteroptera were treated, many also often only briefly in keys. In my work 1,253 species were treated not only in keys but with a full description of each. The words " mixed in much new matter " are, therefore, probably justifiable.

Knight states that three of my new species of Miridae are synonyms and that 12 of those listed do not occur in the territory covered. I wish to take up briefly each of these in the order mentioned by him and show why the error, if any, occurred.

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[6] Bull. Brook. Ent. Soc., April, 1927, 98.

Eioneus gutticornis sp. nov. According to Knight this is *Dolichomiris linearis* Reuter. He is probably right, but Reuter's species was described from West Africa, and until I took it in Florida, had not been taken within 1,500 miles of this country. Is it any great wonder that the error was made?

Mimoceps gracilis Uhler. Knight's article (Can. Ent., 1927, 41) stating that *M. gracilis* is only a color variety of *M. insignis,* did not appear until six months after my book. I am not a seer, and as I was unable to borrow specimens of *insignis,* I published *M. gracilis* as it was then of record.

Platytylellus confraternus (Uhler). Here again Knight's paper in which he "inclines to believe" that *confraternus* does not occur in the eastern states did not appear until after my book was issued. The insect had been recorded from New England by Uhler and Parshley, and there was no evidence that their records were wrong. Knight, without seeing the specimens on which these records are based, states that they "*probably* refer" to his *fraternus.* Moreover, when I first sent to Knight the Dunedin specimen on which he based his var. *collaris,* he wrote: "I am holding for study a female of *Platytylellus* which is certainly very close to *P. confraternus* Uhl. from Colorado. I need a male specimen to decide with certainty." However, he went ahead and described the variety from my Dunedin female and one other female from Gainesville, Fla. Now, in my opinion, Knight to the contrary notwithstanding, the var. *collaris* is only a color form of *confraternus.* I included and described it as such and *P. confraternus* is, therefore, represented in Florida, as stated by me.

Paracalocoris incisus Walker. On October 24, 1921, five years lacking five days before my book appeared, I sent Knight, at his request, certain species of the genera *Platytylellus, Pilophorus,* etc., for study and report. Under date of July 21, 1923, one and a half years later and three and a half years before my book appeared, he made a partial report on the more common species I had sent him. In this letter he wrote: "Among the specimens you sent as *Platytylellus* there were three of a species of *Paracalocoris,* and these I am holding for further study." He did not write, as he states, that he was "publishing," but continued to *hold* them without giving me any name whatever. In July, 1926, two years later, desiring to include the name and description of the bug in my work, I described it in Ent. News as *P. novellus* sp. nov. Later Mr. W. E. China, of the British Museum, to whom

I sent specimens of the *P. novellus* as named, informed me that it was the same as *P. incisus* Walker, and I included it under that name in the Heteroptera.

Mr. China also wrote, " The *Capsus externus* H.-S. of Walker (1873, 91) is *possibly* another variety of *P. incisus*. Whether they are distinct species or merely color varieties of the same species I am not prepared to say without examining a series of specimens." Knight, without seeing the type of Herrich-Schaeffer, and judging solely from the colored plate of that author, has made *P. incisus* Walker a synonym of *externus*. He has also, in a paper issued December 20, 1926, described and named four " spotted-dog "[7] color varieties of *P. externus*. All of these varieties can occasionally be found on one plant, where they are evidently the progeny of one mother. They differ only in the relative amount of red and fuscous on the pronotum and scutellum, yet a scientific name is given each of them by Knight.

Phytocoris megalopsis sp. nov. If, as Knight states, this species is a synonym of his *angustifrons*, it is due to his failure to return to me for examination until too late *my* specimen upon which he based his description of *angustifrons*. I was unable to get back my examples of any *undescribed* species of Miridae sent him, or even the generic name of any of them, until after the greater part of my Miridae paper was in type. On April 29, 1926, I finally wrote and *demanded* that he return them so that I could draw up descriptions from those represented by uniques and include them in my work. On May 7 he returned some of them with his names attached, and stated that he would send the others when I returned those. On May 19 he sent the remainder, including his holotype specimen of *angustifrons*, which I had taken at Dunedin, Fla. Meanwhile I had described what proved to be another species as *angustifrons*, and it was then too late to make the change.

Phytocoris rubellus Knight MS. Under this name Knight states that in his paper, issued October 6, 1926, " Seven species are described from the eastern United States that are not included in Blatchley's book." Of course they were not included. His paper was not published until my book was being bound. He had refused to lend me any specimens whatever and I was lucky to get back his unique types of my specimens of *P. albitylus* and *P. rubellus* long enough to draw up descriptions and affix his names to them.

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[7] By " spotted dog varieties " I mean those which vary in nonconstant color characters, as do the pups in a litter, only in the relative amount of dark and light colors. See page 8 of the Heteroptera.

Creontiades filicornis Walker. In a footnote to page 884 I mention that China had informed me that the *Eustictus grossus* of Uhler is a synonym of this species. This information came too late to change the status of *filicornis* and *grossus* in the text. If Knight thinks that *filicornis* is " such a distinct form that there could scarcely be any mistake in placing it in the keys," why did he not so place it in his " Monograph of Deræocoris " and in the Hemiptera of Connecticut?

Labops hesperius Uhler. My opinion on the relationship of this form and *hirtus* still stands as expressed in my book. Examples of both eastern and western forms were at hand when my description was written.

Pilophorus brimleyi Blatch. This species was described as a *Pilophorus* before I had opportunity to study the generic description of *Barberiella* Poppius, his paper not being available to me until July 19, 1926. Knight, in the Hemiptera of Connecticut, where his *B. apicalis* was described, gave no characterization whatever of the genus *Barberiella* except three lines in a brief key. In a letter received from C. S. Brimley, dated September 8, 1926, he wrote: " Dr. Knight has been here and examined the type specimen of your *Pilophorus brimleyi.* He said it belonged to the genus *Barberiella* and was apparently new." Knight in his 8-page diatribe reverses this opinion and makes *brimleyi* a synonym of his *apicalis.* Until the types of the two specific names can be compared, I prefer to call the one from North Carolina *Barberiella brimleyi* (Blatch.). This statement may perhaps allay to some extent the " shakiness of the confidence " in the new forms described by me.

Pilophorus cinnamopterus (Kirschbaum). My basis for the inclusion of this species was the record of Osborn, accepted by Van Duzee. As Knight had not then expressed his opinion that it does not occur in this country, it was included on the records cited.

Pilophorus amœnus Uhler. Dr. Drake has informed me that the error in the naming of my Fig. 179, as taken from his 1923 work, was due to Knight's having erroneously determined for him the species taken at Cranberry Lake as *P. amœnus.* No mention of this error was on record at the time my text was prepared.

Dicyphus notatus Parshley. On October 19, 1925, after studying the original descriptions of both species, I wrote to Dr. H. M. Parshley, expressing the opinion that his *D. notatus* was a synonym of *D. vestitus* Uhler, and asked him if he thought otherwise to kindly point out any characters separating the two which I could use in a key. He replied rather abstrusely: " Knight has described a new *Dicyphus* from the east, and until I have had some comparisons made I cannot answer your question. *D. notatus* may be indeed the true *vestitus*—Shall write again later," which he never did. I had been unable to borrow specimens from Parshley and, therefore, could not study his *notatus.* Not wishing to make a synonym of it on the basis of the description alone, I included it as valid.

Dicyphus vestitus Uhler. In May, 1926, I sent in exchange specimens of what I had determined as *D. gracilentus* Parshley to E. P. Van Duzee, one of the oldest and best-known authorities on American Heteroptera. Under date of June 10, 1926, he wrote: " I wish to call your attention to the fact that the species you sent as *Dicyphus gracilentus* Parsh. is almost certainly that described by Uhler as *D. vestitus.* I have specimens of *vestitus* sent me by Gillette and Baker at the time their Bulletin came out which differ in no way from the specimens you send. I believe there can be no question as to this synonymy." Relying on this opinion of Van Duzee, which he afterward reiterated, I made *gracilentus* a synonym of *vestitus,* stating in the notes that the synonymy was on the authority of Van Duzee.

Psallus variabilis Fallén. This species I included on the records of Van Duzee the only ones extant at the time my book was published. Knight now states those records were based on examples of one of his recently described varieties of *Lepidopsallus rubidus.* This is, therefore, another of the twelve species of which Knight thinks I was greatly in error for including in my book.

At the close of his article Knight complains that I did not give him due credit for collecting specimens which I borrowed from other parties. The labels on these specimens did not have his name as collector. How was I to know who collected them? As stated in the footnote, page 6 of my work, he refused absolutely to lend me any specimens when he had thousands of them at his command. Had he done so I would have given him credit as I did all others who favored me. He finally, for some unknown reason, relented and sent me, unrequested, a single Cuban specimen of *Sthenarus plebejus* Reut., for which I gave him due credit on page 923 of my work.

Dr. C. H. Drake, of Ames, Iowa, has recently gone over my collection of Tingitidae, with the intention of preparing a review of that family as presented in my book. He has since written me, " Your new species of *Melanorhopala* is probably a synonym." Dr. Drake has, of course, as much of a right to his opinion, as I have to mine, and I still consider it a valid species.

He also states, " I do not agree with your new Tribes of Tingitidae. If you take the genera under the tribes and consider the species of North America, or North and South America, or the world, you will have considerable difficulty in using your tribes." If he or any other critics of these tribes and other subdivisions used in my classification will turn to page 5 they will find this statement: " The characters used and statements made, both in keys and descriptions, are, for the most part, to be considered as applying only to those species occurring in the territory covered by this work. They may be, and doubtless are, capable of much wider application, but it is not safe to assume that such is the case." Again, on the top of page 450, there is also this sentence: " For *convenience* of *treatment* the subfamily (Tinginae) is separated into three tribes." My manual was designed principally to enable the students of Heteroptera in *eastern North America* to identify specimens from that territory. My tribes of Tinginae embrace and cover the genera of that area. Since a tribe or a genus does not exist in nature but is only an artificial concept of man to enable him the more readily to group his species, Dr. Drake, or any other person, is at perfect liberty to make new tribes of Tinginae or to amplify those which I have used, in order to cover the species of the world.

In a recent editorial in Entomological News,[8] Dr. L. O. Howard gave it as his opinion: " Scientific men, especially the entomologists, are growing broader and more unselfish—more considerate of one another, and more interested in the welfare of humanity as a whole." Judging from my personal experiences, it is evident that when Dr. Howard wrote those words he had not come in contact with some of the present day " quit-claim " specialists of this country.

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[8] Vol. XXXVII, 1926, 300.

THE AMERICAN SPECIES OF PTEROLOMA (COLEOPTERA–SILPHIDAE) AND A NEW JAPANESE SPECIES.

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The genus *Pteroloma* was established by Gyllenhal[1] in 1827, for the reception of the north European species described by him in 1810 as Harpalus *Forsstroemii.*[2] In 1859 LeConte[3] described as *Necrophilus tenuicornis,* a species from Puget Sound. This was placed in the Crotch Catalogue[4] in the genus *Agyrtes* Frohl. and later removed by Horn[5] to its present and proper place in *Pteroloma.* Since this time eleven other species have been described, eight from Asia and three from North America. The Old World species[6] were all from the high mountains of central Asia and Japan. The species described from America were *Pteroloma sallaei* Matthews,[7] from Mt. Orizaba, Mexico, and

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[1] Ins. Suec., IV (1827) p. 418.

[2] Ins. Suec., II (1810) p. 111.

[3] Proc. Ac. Nat. Sc. Phil. (1859), p. 84.

[4] Check List of the Col. of Am. North of Mex., by G. R. Crotch, Salem, Mass., 1873.

[5] Synop. of Sylphidae of the U. S., by G. H. Horn, Tr. Am. Ent. Soc., VIII (1880) p. 245.

[6] *P. davidis* Fairm., from Mupin, Setschuan, China, Ann. Soc. Ent. Belg., XXXV (1891), C. R., p. cxci.

P. anglorossicum Sem., from mountains between Pamirs and Cashmere, Horae Soc. Ent. Ross., XXV (1891) p. 297.

P. potanini Sem., from Gan Su, N. W. China, Horae Soc. Ent. Ross., XXVII (1893) p. 336, 338.

P. turkestanicum Sem., from W. Turkestan, Horae Soc. Ent. Ross., XXVII (1893) p. 337, 340.

P. discicolle Lewis, from top of Mt. Nantassan, Japan, Ann. Mag. Nat. Hist., 11 (1893) p. 356.

P. harmandi Portevin, from Darjeeling, Himalayas, Bul. Mu. Hist. Nat., Paris, 9 (1903) p. 334.

P. calathoides Portevin, from near Tokio, Japan, Bul. Mu. Hist. Nat. Paris, 11 (1905) p. 421.

P. rosti Portevin, from Cashmire, Bul. Soc. Ent. Fr., 1907, p. 252, fig.

[7] Biol. Centr. Amer., Col. II(1) (1888) p. 97, pl. 3, fig. 11.

Pteroloma caraboides Fall,[8] from Wenatchee on the east side of the Cascade Mountains of Washington and *Pteroloma tahoeca* Fall[9] from Lake Tahoe, California. The three species described from America with *forsstroemi* for this last is also to be found in Alaska and the mountains of western Canada, give us five described species in the New World. To this list, I will add one more from this country and at the same time make known a third species from Japan.

Pteroloma Gyll. was placed by Horn (1880) in the tribe Silphini chiefly because of the contiguous posterior coxae. It differs, however, markedly from all other members of that tribe by possessing long and slender, slightly clubbed antennae, and by lacking tibial spinules, in these regards resembling *Lyrosoma* Mann., the only genus in Horn's tribe Lyrosomini. Semenow[10] more closely associates *Pteroloma* and *Lyrosoma* and Portevin[11] follows him in this regard for he places them both with *Brachyloma* Portevin, an oriental genus closely related to *Pteroloma,* in the tribe Pterolomini. With this arrangement I thoroughly agree for our two genera resemble one another as regards most fundamentals and only differ, *Pteroloma* by having the posterior coxae contiguous (not absolutely so in all specimens) and *Lyrosoma* by having them widely separated. They also have quite similar habits. I have found *Lyrosoma opacum* Mann. feeding on the rotting kelp or seaweed at Unalaska, Alaska, and the various species of *Pteroloma* are generally to be found under rocks or rubbish in damp situations, as a rule along mountain streams, where they no doubt feed upon the decaying vegetation found in such locations.

The following review has been based in the main upon material in my own collection but I have as usual received assistance from my friends. M. Banninger, of Giessen, Germany, sent me typical specimens from Europe of *Pteroloma forsstroemi* (Gyll.) to compare with those from this country. M. H. Hatch, of the University of Washington, furnished numerous bibliographical references and also loaned me some of his specimens. Ralph Hopping, of Vernon, B. C., and M. C. Lane, of Toppenish, Wash., also gave or loaned me material and the California Academy of Sciences, through E. P. Van Duzee, permitted me to study and describe the new Japanese species from the Koebele collection. To all of these I wish to express my thanks.

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[8] Can. Ent., XXXIX (1907) p. 235.

[9] Can. Ent., LIX (1927), p. 136.

[10] Revisio Specierum ad Silphidarum, genera *Pteroloma* Gyll. et *Lyrosoma* Mann. Spectantium, auctore Andre Semenow, Horae Sc. Ent. Ross., XXVII (1893) p. 335–346.

[11] Ann. Soc. Ent. Belg., LVIII (1914) p. 218.

KEY FOR THE SEPARATION OF THE AMERICAN SPECIES.

Prothorax distinctly constricted or narrowed posteriorly, much narrower at base than base of elytra, somewhat cordate...1
Prothorax but slightly narrowed posteriorly, almost as broad at base as base of elytra, not cordate......................3
1. Prothorax slightly narrower at base than apex, with deep fovea in front of scutellum as well as near hind angles and with humeral margin of elytra serrate..*forsstroemi* (Gyll.)
   Prothorax broader at base than apex, without basal foveae and elytral margin not serrate..........................2
2. Larger species, 6–7 mm. in length, somewhat elliptical in general shape, pronotum minutely alutaceous and rather finely punctured on disk, denser near base.......*caraboides* Fall
   Smaller species, 4.5 mm. in length, elongate and subparallel, pronotum smooth and shining, impunctate on disk, rather deeply punctured toward the base...........*sallaei* Matth.
3. Hind angles of prothorax angulate......................4
   Hind angles of prothorax rounded........*tenuicorne* (Lec.)
4. Pronotum minutely alutaceous and with a few fine punctures at most, chiefly evident at base..............*tahoeca* Fall
   Pronotum smooth and shining, rather coarsely punctured, sparse on disk and dense at sides and base.
   arizonica sp. nov.

Pteroloma forsstroemi (Gyllenhal). (Plate I, fig. 1.)

This species is the most distinct of any in our fauna, its nebria-like prothorax with pronounced basal foveae and the serrate margined elytra enabling it to be readily separated from the others. In addition it is piceous brown generally with reddish brown margins, smooth and shining; with head rather sparsely, coarsely punctured and with an evident fovea between the eyes; the prothorax with a moderately wide and almost flat margin, a few coarse punctures, most numerous near margins; the scutellum not distinctly punctured; the elytra with a rather broad lateral margin, striae coarsely punctured, a few obscure punctures on the first, third and fifth intervals, the epipleura coarsely punctured; and the mesosternum obscurely punctured. Specimens from this country which I have carefully compared with typical European specimens are slightly smaller, with the pronotal punctures less numerous and the strial punctures coarser, otherwise not different.

It is found in the boreal parts of Europe, extending through Siberia to Kamchatka, in Alaska, and the mountains of western Canada, my American specimens being from Lake Louise, Alberta, Canada.

Pteroloma caraboides Fall. (Plate I, fig. 2.)

Caraboides is our largest species and much like a typical Calathus in general facies. It is more or less alutaceous above and hence somewhat opaque; with the head rather finely, sparsely punctured and with a vague frontal impression; the prothorax gradually narrowed and the sides sinuate behind, the lateral margin narrow, and the upper surface rather finely and evenly though not closely punctured; the scutellum with a few fine punctures; the elytra narrowly margined, the striae deep and finely, closely punctured, the alternate intervals with a few vague punctures; and the episternae and epipleurae not evidently punctured.

This species was described from specimens taken by H. F. Wickham at Wenatchee, E. Washington. Besides a number of Wickham's typical specimens, I have before me material from the following localities: Waha, Idaho (Lane); Spious Creek, B. C. (Hopping), and Devil's Kitchen, Warner Valley, Lassen Nat. For., Calif. (Hopping). I also have specimens from a large series collected by Albert Koebele and labeled Summit, Calif. These, I believe, were in reality secured at Easton, Wash., not far from the type locality, a place where Mr. Koebele collected extensively. Many of his specimens, unfortunately, had the wrong locality labels attached. The locality, Mt. San Antonio, So. Calif., cited by Fall, I also very much doubt. A discontinuous distribution of this kind would be remarkable.

Pteroloma sallaei Matthews.

Judging from the description, this species is much like the preceding but smaller, more parallel, shining and with the pronotum rather deeply punctured toward the base.

The unique was from the Sallé collection and was taken on Mt. Orizaba, Mexico.

Pteroloma tenuicorne (Le Conte). (Plate I, fig. 3.)

This is a species with regard to which there has been much confusion. The type specimen was collected by George Davidson, of the U. S. Coast and Geodetic Survey, at Puget Sound. I have examined this critically. I also have before me a specimen from the Hood River, Ore., that was carefully compared with this and found to agree in all particulars. These both differ materially from most of the specimens, mainly from the Sierra Nevada mountains, which Horn (1880) had before him when he wrote his revision of the Silphidae. The latter were undoubtedly the species which follows.

The most distinctive feature of the true *tenuicorne* is that it has the hind angles of the prothorax rounded, a character not found in any of our other species. In addition it is of a generally elongate elliptical shape, dark brown or reddish brown in color, usually with lighter margins; the head distinctly but sparsely punctured; the prothorax broadest back of middle, the pronotum flattened laterally, rather coarsely and closely punctured at sides and base, more finely and sparsely on disk; the scutellum with a few fine punctures; the elytra with striae moderately coarsely and closely punctured and with a few indistinct punctures on alternate intervals; and the epipleura coarsely and the meta episternal area sparsely punctured.

This species is known to me from the following places: Puget Sound (type); Mt. Hood and Hood River, Ore. (Van Dyke); Mt. Bonaparte, Okanagon Co., Wash. (Lane); Cedar Mt., Moscow, Ida. (Lane); Mont.; Waha Lake, Ida. (Lane-Hatch coll.); Warner Mts., Modoc Co., Calif. (Hopping), and Butte Creek, Lassen Co., Calif. (Hopping). Specimens in the collection of the late Professor O. B. Johnson, now at the University of Washington, and labeled Gilroy Hot Springs, Calif., were most likely collected in the Puget Sound country.

Pteroloma tahoeca Fall. (Plate I, fig. 4.)

> Robust, elliptical, reddish brown with margins, antennae and epipleurae lighter, the legs somewhat flavous, the upper surface finely alutaceous and as a result more or less subopaque. Head finely, sparsely punctured and with a vague interocular impression. Prothorax almost twice as broad as long, broadest at middle, anterior margin deeply emarginate with anterior angles prominent and subacute, base transverse and distinctly broader than apex, sides evenly and broadly arcuate from front angles to base, the sides in a few cases slightly sinuate posteriorly, hind angles sharp and slightly obtuse, disk moderately convex, broadly deplanate laterally

and with fine side margins, finely sparsely and irregularly punctured (sometimes almost impunctate). Scutellum with a few, fine, scattered punctures. Elytra fully three times as long as prothorax and one-fourth broader than long, elliptical, attenuated apically, margin simple, not serrate humerally, more shining than head and pronotum, convex, striae distinctly impressed and finely, closely punctured, the intervals slightly convex and the first, third and fifth with an occasional puncture. Beneath with epipleurae smooth and the sternal side pieces without evident punctation. Length 6.5 mm., breadth 3 mm.

This species differs from *tenuicorne* Lec. with which it has generally been confused by being considerably broader; less shining; the prothorax more deeply emarginate in front, more broadly arcuate at sides, with hind angles not rounded, and with disk very finely punctured at most; the elytra more broadly arcuate at sides, the strial punctuation not so distinctly defined, the punctures of the alternate intervals hardly evident; and the epipleura smooth and deeply punctured.

This species was described from Lake Tahoe and Tuolumne Meadows, Calif., other localities in California known to me are: Simms Siskiyow Co.; Strawberry Vall., Eldorado Co.; Yosemite Vall.; and Mt. Lyell, all collected by myself; besides Truckee (Hatch coll.); Mt. Sillmann, Mineral King, Grant Forest and other localities in Tulare Co. as well a few from Eldorado Co. in the Hopping collection. It is a fairly common species found along the margins of the alpine streams throughout the Sierra Nevada mountains of California.

Pteroloma arizonica Van Dyke n. sp. (Plate I, fig. 5.)

Robust, elliptical, reddish brown, mesosternum and abdomen darker, upper surface smooth and shining. Head moderately coarsely, sparsely and irregularly punctured and with an evident interocular impression. Prothorax about twice as wide as long, broadest posterior to middle, anterior margin moderately emarginate with anterior angles broad, and rounded at apices, base transverse and distinctly broader than apex, sides evenly but not broadly arcuate from front angles to base, hind angles obtuse, not rounded, disk moderately convex, broadly sulcate laterally and with fine margin, coarsely and closely punctured at base and sides, more finely and sparsely at center. Scutellum with a few fine punctures. Elytra three times as long as prothorax and one-fourth longer than broad, elliptical, margins simple, not serrate, disk convex, striae finely impressed and closely, finely punctured, intervals flattened, the alternate with a few punctures. Beneath with epipleura coarsely punctured and side pieces of meso- and metathorax very finely punctured. Length 5.5 mm., breadth 3 mm.

Holotype, a unique female in my collection, taken near Prescott, Ariz., February 11, 1907, by J. Aug. Kusche.

This species somewhat resembles the preceding but as regards its smoothness, shape of prothorax and punctured epipleura and sternites, agrees with *tenuicorne* Lec. The hind angles of the prothorax are, however, distinctly angulated, not rounded and the pronotum has a broad, shallow sulcus laterally.

KEY FOR THE SEPARATION OF THE JAPANESE SPECIES.

Head impunctate, anterior angles of prothorax prominent, reddish brown, length 4 mm. .... *discicolle* Lewis.
Head punctate, color more or less uniform 1
1. Prothorax distinctly narrowed posteriorly, somewhat cordate and with distinctly impressed fovea in front of scutellum, elytral margins serrate in humeral region, length 6.5 mm. **koebelei** sp. nov.
Prothorax with sides arcuate to base, hind angles sharp and obtuse, length 6 mm. .... *calathoides* Portevin.

Pteroloma koebelei Van Dyke n. sp. (Plate I, fig. 6.)

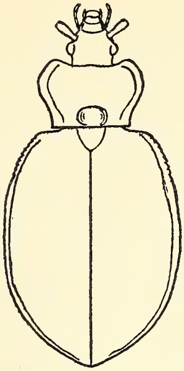
Elongate, dark reddish brown, margins of elytra, antennae and legs rufous, the upper surface smooth and shining. Head very distinctly punctured, more sparsely in front and closer behind and with shallow interocular impression. Prothorax less than twice as broad as long, broadest at middle, anterior margin deeply emarginate, anterior angles subangulate and prominent, base transverse, but little broader than apex but considerably narrower than base of elytra, sides almost straight and broadly diverging from anterior angles, rounded at middle, thence slightly converging and sinuate to base, the hind angles almost right angled, the disc slightly convex with broad, distinctly channeled side margins, coarsely, sparsely and irregularly punctured, and with well defined fovea in front of scutellum and shallow depressions near hind angles. Elytra over three times as long as prothorax and about one-fourth broader than long, elliptical, the side margin distinctly serrate in the humeral region, disk convex, striae well impressed and rather finely, closely punctured, the intervals slightly convex and with a few distinct punctures on the first, third, fifth and seventh. Beneath with epipleura coarsely punctured and the meso- and metaepisterna and epimeron finely and somewhat obscurely punctured. Length 6.5 mm., breadth 3.25 mm.

Holotype, a unique female in the Koebele collection of the California Academy of Sciences, taken by Albert Koebele at Yumoto, Japan.

This species is without doubt somewhat related to *Pteroloma forsstroemi* (Gyll.) having the same cordate type of prothorax with marked basal foveae and serrate margins of elytra, but it differs by having the prothorax broader, less narrowed behind, with the side margins broader and more definitely channeled and the punctuation more abundant. Of the other Japanese species it is perhaps more closely related to *discicolle* Lewis than to *calathoides* Portevin though evidently quite distinct from both.

EXPLANATION OF PLATE I.

Fig. 1. *Pteroloma forsstroemi* (Gyll.).
Fig. 2. *Pteroloma caraboides* Fall.
Fig. 3. *Pteroloma tenuicorne* (Lec.).
Fig. 4. *Pteroloma tahoeca* Fall.
Fig. 5. *Pteroloma arizonica* sp. nov.
Fig. 6. *Pteroloma koebelei* sp. nov.



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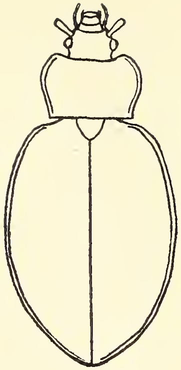

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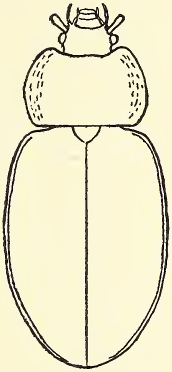

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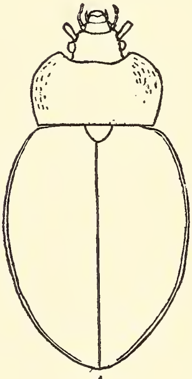

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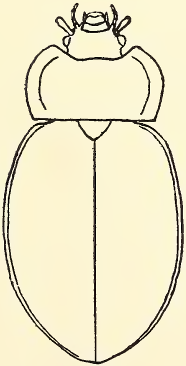

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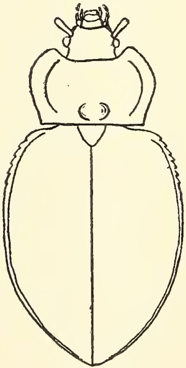

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NEW SPECIES OF PHYTOCORIS FROM NORTH AMERICA (HEMIPTERA, MIRIDAE).[1]

By Harry H. Knight, Ames, Iowa.

Phytocoris osborni n. sp.

Runs in my key (Hemiptera Conn., 1923, p. 616) to the couplet with *pallidicornis* Reut. and *rubropictus* Kngt., but is distinguished from both species by the pale hairs on the first antennal segment and by the prominent lineate reddish lines on pronotum and hemelytra.

♂. Length 6 mm., width 2 mm. Head: width .98 mm., vertex .40 mm. Rostrum, length 3.2 mm., reaching to base of genital segment, yellowish, fourth segment blackish. Antennae: segment I, length 1.12 mm., thickness .18 mm., pale yellowish, sparsely flecked with red, clothed with numerous yellowish hairs, length of many hairs about equal to thickness of segment; II, 2.48 mm., pale, yellowish brown apically; III, 1.75 mm., yellowish brown; IV, 1.5 mm., dusky brown. Pronotum: length .87 mm., width at base 1.5 mm.

Dorsum clothed with rather prominent, simple yellowish hairs, and intermixed with very fine, more closely appressed, pale sericeous pubescence, a few fuscous hairs arising from the dark marks on pronotum. Color pale yellowish and marked with reddish lines and reticulations; two lines on frons which become obsolete on vertex but reappear on collum, mark across juga, dorsal margin of lora and of bucculae, median line of gula, two marks on xyphus, line behind lower margin of eye which continues across coxal cleft and middle of propleura, line along dorsal margin of propleura, four lines on pronotal disk of which the outer pair cross outer margin of calli, the inner pair behind the calli and broken to form four spots, two large spots each side of mesoscutum, a large spot each side on apical half of scutellum, along claval vein, a broken line of marks parallel to claval vein and dividing the area next to scutellum, along radial vein to apical area of corium where it breaks into reticulate markings, a broken line near middle of corium, reticulate marks and spots on cuneus, mark on side of sternum, spot on base of coxae, reticulate markings on femora, longitudinal line on side of venter and another on dorsal edge, red to dark red, marks on pronotal disk and sides of venter becoming fuscous. Tibiae with apices brown; tarsi yellowish to brown, tips darker. Membrane and veins pale, apical area and more or less within areoles conspurcate with fuscous, some marks becoming obsolete. Genital characters very similar to those of *pallidicornis* Reut., but with a well defined and rather sharp tubercle above base of left clasper.

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[1] Contribution from the Department of Zoology and Entomology, Iowa State College, Ames, Iowa.

♀. Length 6.1 mm., width 2.3 mm. Head: width 1 mm., vertex .47 mm. Antennae: segment I, length 1.33 mm.; II, 2.6 mm.; III, 1.92 mm.; IV, 1.42 mm. Pronotum: length .96 mm., width at base 1.7 mm. Very similar to the male in pubescence and coloration.

Holotype: ♂, July 2, 1897, Little Rock, Iowa (H. Osborn); Iowa State College collection. *Allotype:* taken with the type. *Paratypes:* 2 ♂, 1 ♀, taken with the types. ♂, ♀, July 7, 1897, Sioux City, Iowa (H. Osborn). KANSAS—♀, July 2, Riley County (G. A. Dean). NEBRASKA—♂, ♀, "Neb." (U. S. N. M.). The writer takes pleasure in naming this species after Prof. Herbert Osborn who collected the best material of this species and is noted for pioneer studies on the Hemiptera of Iowa.

Phytocoris nicholi n. sp.

Allied to *bipunctatus* Van D., but size larger; corium without white spot on apical field, second antennal segment with basal pale band set close to base; legs and ventral surface strongly reddish; membrane dark fuscous, sharply conspurcate with white.

♀. Length 5.3 mm., width 1.8 mm. Head: width .91 mm., vertex .49 mm.; frons and vertex strongly convex which is not true of *bipunctatus*; reddish, spot each side of apex of tylus pale, frons shaded with fuscous. Rostrum, length 2.6 mm., reaching upon fifth ventral segment, reddish, last two segments blackish. Antennae: segment I, length 1.33 mm., dark reddish, three or four pale spots on dorsal aspect, each with a pale bristle which in length about equals thickness of segment; II, 2.63 mm., dark reddish to fuscous, pale at base, a broader pale band with its basal edge beginning at middle of segment; III, 2.01 mm., black, pale at base; IV, 1.3 mm., black. Pronotum: length .81 mm., width at base 1.45 mm.

Dorsum clothed with both simple and compressed black pubescence, intermixed with white sericeous pubescence which is more abundant on mesoscutum, scutellum, clavus, and corium; the compressed black hairs most abundant on pronotal disk. Ventral surface chiefly reddish, dorsum grayish testaceous and darkened with fuscous; pronotal disk with an undulating black line bordering the white basal edge, calli and collar reddish like the head. Scutellum fuscous, apex and a few spots pale. Hemelytra with pale background, claval vein, inner and apical margins of corium, radial vein, and embolium except for some pale spots, fuscous; cuneus fuscous, outer margin except apex pale to reddish. Membrane dark fuscous, conspurcate with white dots and reticulations, a white angulate mark on margin by tip of cuneus and a second somewhat larger one at about middle of lateral margin; veins reddish, the dividing vein fuscous. Legs dark red, femora irrorate with more or less obsolete pale dots; tibiae reddish brown, triannulate with pale, hind pair with only two broad bands, the basal one interrupted; tarsi fuscous. The hind femora are very broad for three-fourths their length which is rather unusual in the genus Phytocoris.

♂. Length 4.7 mm., width 1.6 mm. Head: width .89 mm., vertex .42 mm. Antennae: segment I, length 1 mm.; II, 2.37 mm.; III, 1.64 mm.; IV, 1.24 mm. Pronotum: length .78 mm., width at base 1.39 mm. Very similar to the female in pubescence and coloration. Genital characters distinctive, without tubercles above base of claspers; claspers very similar to those of *bipunctatus,* but right clasper more slender and acuminate apically.

Holotype: ♀, Sept. 9, 1925, Santa Rita Mts., alt. 4,500 ft., Arizona (A. A. Nichol); author's collection. *Allotype:* taken with the type. *Paratypes:* 3 ♂, taken with the types by Mr. Nichol. ♀, August, San Bernardino Mts., alt. 3,750 ft., Cochise Co., Arizona (F. H. Snow).

Phytocoris listi n. sp.

Suggestive of *carnosulus* Van D., but distinguished by the longer and more horizontal head, also by the first antennal segment which is not equal to width of head.

♂. Length 5.5 mm., width 1.7 mm. Head: width .95 mm., vertex .34 mm.; length .89 mm., subhorizontal, eyes prominent, protruding strongly above level of vertex; pale, lower third of tylus, genae, and more or less on basal half of juga and lora, fuscous, also with fine oblique fuscous lines on frons. Rostrum, length 2.87 mm., reaching to base of genital segment, fuscous, basal and sometimes the second segment fuscous. Antennae: segment I, length .59 mm., thickness

.11 mm., pale, base and apex and mark on middle, black, set with a few weak, pale brownish setae which in length scarcely equal thickness of segment; II, 1.9 mm., with prominent yellowish pubescence, fuscous, pale at base; III, 1.18 mm., fuscous; IV. .92 mm. fuscous. Pronotum: length .83 mm., width at base 1.42 mm.

Dorsum clothed with rather fine, partly sericeous, pale to brownish pubescence, and intermixed with sparsely set black hairs, more bristle-like on clavus, corium, and scutellum, forming a row on claval vein, also one or two rows on corium. Color pale to pale yellowish, more or less darkened with fuscous, ventral surface black, venter somewhat shining; propleura fuscous except lower margin and on coxal cleft, disk rather indistinctly spotted and marked with fuscous; scutellum black, basal angles, apex, and median line pale, the median line sometimes obscured, mesoscutum blackish. Hemelytra with fuscous spot about base of each hair, these more or less connected and irregularly shaded with light fuscous, giving an irregular maculated appearance; cuneus black, basal half pale but more or less invaded with fuscous. Membrane fuscous, the dark color resolving into numerous small, indistinct spots covering a paler background; veins fuscous, pale on apex. Legs rather slender, especially the hind femora; pale, femora with brownish black but so thickly marked with pale irrorations that the dark color is more in the form of reticulations; tibiae with four fuscous bands which are separated by broader pale annulations; tarsi fuscous. Genital characters distinctive, segment wall above base of left clasper produced somewhat into a broad flat tubercle, while only a slight tubercle is indicated on the right side; right clasper of even thickness, straight, truncated at apex but with a prominent claw on inner edge.

Holotype: ♂, June 17, 1920, Fort Collins, Colorado (Geo. M. List); author's collection. *Paratypes:* ♂, June 24, 1920, topotypic (Geo. M. List); Colorado Agricultural College collection. ♂, July 12, 1900, topotypic (E. D. Ball). ♂, July 9; 2 ♂, July 10; 2 ♂, Aug. 10, 1915, Ardmore, South Dakota (E. G. Holt); U. S. Biological Survey collection.

Phytocoris fulvipennis n. sp.

Allied to *taxodii* Kngt., but distinguished by the shorter first antennal segment which is not equal to width of head across eyes; hemelytra uniformly fulvous with a small fuscous dot on membrane margin of corium near base of cuneus.

♂. Length 3.7 mm.,width 1.3 mm. Head: width .80 mm., vertex .24 mm. Rostrum, length 1.6 mm., reaching upon the fourth ventral segment. Antennae: segment I, length .67 mm.; II, 1.67 mm.; III, 1.24 mm.; IV, .77 mm.; uniformly yellowish, last segment dusky. Pronotum: length .57 mm., width at base 1.09 mm.; disk reddish to fuscous, sides yellow; disk clothed with prominent fuscous pubescencee and intermixed with several small patches of silvery sericeous pubescence which produce a spotted appearance. Scutellum yellow, mesoscutum darker on middle. Hemelytra light yellow to fulvous, lateral margins more yellowish, a small fuscous dot on membrane margin of corium near base of cuneus; cuneus not differing in color from corium and embolium; clothed with golden yellow simple pubescence. Membrane uniformly pale fumate, veins pale yellowish. Ventral surface and legs yellowish; hind femora reddish on apical half, irrorate with small pale spots; tibiae uniformly pale, spines yellowish brown. Genital claspers very close to those of *taxodii* but the shorter antennal segments and shorter rostrum distinguish this species at once.

♀. Length 4.2 mm., width 1.4 mm. Head: width .77 mm., vertex .30 mm. Rostrum, length 1.7 mm., reaching upon fourth ventral segment. Antennae: segment I, length .71 mm.; II, 1.77 mm.; III, .91 mm.; IV, .74 mm. Pronotum: length .66 mm., width at base 1.24 mm. Very similar to the male in form and coloration.

Holotype: ♂, July 23, 1926, Jacksonville, Florida (E. D. Ball); author's collection. *Allotype:* same data as the type. *Paratypes:* ♂ 3♀, taken with the types "on Cypress" by Dr. E. D. Ball. ♂, June 28–July 2, 1912, Okefenokee Swamp, Georgia (J. C. Bradley).

Phytocoris piceicola n. sp.

Dorsal aspect suggestive of *plenus* Van D., but genital claspers indicate a closer relationship with *heidemanni* Reut. and *commissuralis* Van D.; distinguished from these latter species by the lack of black scale-like pubescence; differs from *plenus* in lacking sharp edged tubercles on the genital segment.

♂. Length 7.1 mm., width 2.2 mm. Head: width 1.09 mm., vertex .355 mm.; frons less convex than in *plenus,* with nearly obsolete transverse lines. Rostrum, length 3 mm., reaching upon sixth ventral segment, pale to brownish, apex black. Antennae: segment I, length 1.4 mm., blackish with several white glabrous spots, each spot giving rise to a fuscous bristle which in length about equals thickness of segment, ventral surface pale from base to apex; II, 3.2 mm., fuscous, apical half black, a narrow pale band at base; III, 1.6 mm., black, narrowly pale at base; IV, 1.15 mm., black. Pronotum: length 1.03 mm., width at base 1.81 mm.; fuscous to black, collar above, calli and extending backward to include the central half of disk, yellowish, narrow basal edge of disk white; lower margin of propleura and a mark at top of coxal cleft pale, xyphus and lower margin of collar white. Scutellum reddish to dark brown, the dark color broken by irregular pale flecks and spots, median line and widening to include apex, pale.

Dorsum clothed with yellowish and fuscous simple pubescence, and intermixed on the hemelytra with white sericeous, almost scale-like pubescence which occurs more thickly on the pale spots and areas. Hemelytra fuscous to blackish, varied and marked with pale much as in *plenus,* the pale area on middle of corium is larger while that at apex of corium and on cuneus is much less conspicuous; cuneus with apical half and all of the membrane margin fuscous. Membrane much as in *plenus* but ground color more white, conspurcate with irregular fuscous marks and dots, darker within the larger areole; veins fuscous, becoming pale around apex of larger areole. Sternum and pleura black, venter fuscous, paler beneath except genital segment. Hind femora not so slender and tapering on apical half as in *plenus*; coxae white, femora fuscous, thickly irrorate with pale; tibiae chiefly pale, varied somewhat with small fuscous dots but not forming bands except on front pair where the tarsal end is black; tarsi yellowish, dark at base and apex. Genital claspers more suggestive of *heidemanni* Reut. than *plenus,* without tubercles near base although the segment wall on left side is rather swollen and thickened.

♀. Length 6.3 mm., width 2.4 mm. Head: width 1.06 mm., vertex .44 mm. Antennae: segment I, length 1.48 mm.; II, 1.75 mm.; III, 1.57 mm.; IV, 1.09 mm. Very similar to the male in pubescence but more broadly pale in color; pronotum pale yellowish, the dark color reduced to a black band along basal margin; hemelytra more pale than fuscous, the larger pale areas more or less joined.

Holotype: ♂, August 7, 1925, taken a few miles above Stonewall, alt. 8,500 ft., near Trinidad, Colorado (H. H. Knight); author's collection. *Allotype:* taken with the type. *Paratypes:*

12 ♂, taken with the types on spruce (*Picea* sp.) by beating the branches. ♂ 2 ♀, July 27, 1917, Mt. Lemon, alt. 9,000 ft., Santa Catalina Mts., Arizona (H. H. Knight); one female is much paler than the other specimens but I am unable to place it elsewhere. 2 ♀, July 23; ♀, July 27; ♀, July 28, Williams ,Arizona (H. S. Barber).

Phytocoris simulatus n. sp.

Allied to *piceicola,* having much the same aspect but size smaller and paler in color; distinguished by the shorter first antennal segment which is not equal to width of head, by the more distinctly banded tibiae and the differently formed genital claspers.

♂. Length 5.8 mm., width 1.9 mm. Head: width 1.02 mm., vertex .32 mm.; yellowish, frons flecked with red, middle of tylus, dorsal margin of lora and of bucculae, marked with red. Rostrum, length 2.8 mm., reaching upon base of genital segment, yellowish, blackish apically. Antennae: segment I, length .86 mm., yellowish to dusky brown, with several pale glabrous spots from each of which arises a dusky seta that in length about equals thickness of segment, also clothed with short black pubescence; II, 2.43 mm., yellowish brown, becoming fuscous on apex, base with a pale annulus; III, 1.16 mm., fuscous, narrowly pale at base; IV, .92 mm., fuscous. Pronotum: length .84 mm., width at base 1.48 mm.; yellowish to dusky, basal margin fuscous except the extreme edge which is pale, also dusky to fuscous on calli and lateral margins of disk, lower margin of pleura and the xyphus white. Scutellum pale, obscurely variegated with brown.

Dorsum clothed with rather stiff black pubescent hairs and intermixed with rather sparsely set, silvery white flattened pubescent hairs, especially on pronotal disk and head; also with a few flattened black hairs on hemelytra, perhaps more abundant apically on corium and clavus. Hemelytra pale yellowish to dusky, a fuscous area just before middle of corium and embolium, also more or less darkened on clavus bordering claval suture; cuneal angle of corium white but bordered just before and along apex of clavus with fuscous; cuneus pale, outer edge white, apex and two or three spots on either margin fuscous. Membrane dark fuscous, irrorate and conspurcate with pale, the largest pale area bordering apex of cuneus; larger areole and veins dusky yellow, without distinct paler irrorations. Ventral surface pale to yellowish, sternum, pleura, and genital segment chiefly fuscous.

Legs pale to yellowish, femora except base fuscous, thickly irrorate with pale spots, a few larger white areas on hind femora; tibiae triannulate with white and with fuscous, more distinct on front pair; tarsi fuscous. Genital characters closely related to *piceicola,* but distinguished by form of the right clasper which on its dorsal margin near base has a low but distinct tubercle-like projection.

♀. Length 5.3 mm., width 1.8 mm. Head: width .98 mm., vertex .41 mm. Antennae: segment I, length .89 mm.; II, 2.5 mm.; III, 1.2 mm.; IV, .99 mm. Pronotum: length .83 mm., width at base 1.48 mm. Very similar to the male in pubescence and coloration.

Holotype: ♂ August 10, 1925, Ft. Garland, Colorado (H. H. Knight); author's collection. *Allotype:* same data as the type. *Paratypes:* 10 ♂ 5 ♀, taken with the types on *Pinus edulis* which is the host plant of the species. 2 ♂ Aug. 7, 1925, Stonewall, near Trinidad; ♀ Aug. 13, 1925, Durango, Colorado (H. H. Knight). ♀ July 12, ♂ July 21, 1915, Jemez Springs, New Mexico (J. Woodgate).

Phytocoris mirus n. sp.

Related structurally to *piceicola* but having a very different color aspect; brownish red and varied with pale, first antennal segment uniformly yellowish.

♂. Length 7 mm., width 2.3 mm. Head: width 1.08 mm., vertex .34 mm. Rostrum, length 2.9 mm., reaching upon sixth ventral segment. Antennae: segment I, length 1.3 mm., yellowish, the glabrous spots slightly paler, spines yellowish; II, 3.12 mm., dusky yellow, slightly darker apically; III, 1.5 mm., fuscous, slightly paler at base; IV, 1.2 mm., fuscous. Pronotum: length 1.1 mm., width at base 1.83 mm. Dorsum clothed with yellowish to brown simple pubescence and intermixed with white sericeous, more or less scale-like pubescence, more abundant than in *piceicola,* especially on head, pronotum and scutellum. General coloration brownish red, being more reddish than brown; tip of scutellum, marks on middle and apex of corium, and base of cuneus, pale; brown to dark brown on the areas which correspond to fuscous in *piceicola.* Membrane with whitish ground color, conspurcate with irregular fuscous marks and dots, the whole having a tinge of brownish, uniformly fuscous brown within areoles, veins reddish. Legs yellowish, femora chiefly reddish, thickly irrorate with numerous small and a few larger yellowish spots; tibiae uniformly yellowish, spines brown. Genital characters very similar to those of *piceicola* but distinguished by the broader and less sharply hooked apical half of right clasper, also the wall of genital segment at base of right clasper is not angulate.

♀. Length 6.6 mm., width 2.3 mm. Head: width 1.03 mm., vertex .44 mm. Antennae: segment I, length 1.48 mm.; II, 3.3 mm.; III, 1.74 mm.; IV, 1.2 mm. Pronotum: length .99 mm., width at base 1.77 mm. Very similar to the male in pubescence and coloration.

Holotype: ♂ August 7, 1925, taken a few miles above Stonewall, alt. 8,500 ft., near Trinidad, Colorado (H. H. Knight); author's collection. *Allotype:* taken with the type. *Paratype:* ♂, taken with the types on spruce (*Picea* sp.). ♀ July 27, 1917, Mt. Lemon, alt. 9,000 ft., Santa Catalina Mts., Arizona (H. H. Knight). ♀ July 29, 1905, Huachuca Mts., Arizona (H. G. Barber). ♂, Manitou, Colorado (E. S. Tucker), U. S. N. M. collection.

Phytocoris tinctus n. sp.

Allied to *stellatus* Van D., but distinguished by the paler, yellow color with fulvous tint; also differs in structure of the male genital claspers.

♂. Length 5.8 mm., width 2 mm. Head: width 1.01 mm., vertex .29 mm. Rostrum, length 1.94 mm., scarcely reaching posterior margin of hind coxae. Antennae: segment I, length .69 mm., more red brown than *stellatus*; II, 2.1 mm., fuscous, narrowly pale at base; III, 1.48 mm., fuscous, narrowly pale at base; IV, .92 mm. Pronotum: length .72 mm., width at base 1.45 mm.; yellow, posterior half of disk behind calli white, with four fuscous dots on subbasal margin, setigerous fuscous points are apparent in the white area. Scutellum uniformly yellowish, without the fuscous spots found in *stellatus*.

Dorsum clothed with fuscous simple hairs, intermixed with finer yellowish pubescence and a smaller amount of white sericeous pubescence. Coloration yellowish to fulvous, more reddish on cuneus, clavus, and hind femora; posterior half of disk except laterally, irregularly on middle of corium, and inner apical angle of corium, pale to white. Cuneus pale only at inner basal angle. Membrane pale to dusky, obsoletely marked with pale fuscous dots and areas, veins fulvous. Legs yellowish, femora except base strongly reddish, irrorate with white dots, the hind pair with white spots arranged in transverse series; tibiae pale, irregularly dotted and marked with reddish brown to fuscous. Sternum and genital segment fuscous. Genital claspers very similar to *stellatus* but right clasper more slender and acuminate on apical half.

♀. Length 5.5 mm., width 1.7 mm. Head: width .93 mm., vertex .38 mm. Antennae: segment I, length .65 mm.; II, 1.7 mm.; III, 1.09 mm.; IV, .88 mm. Pronotum: length .74 mm., width at base 1.42 mm. Very similar to the male in pubescence and coloration.

Holotype: ♂ August 7, 1925, Stonewall, alt. 8,000 ft., near Trinidad, Colorado (H. H. Knight); author's collection. *Allotype:* taken with the type. *Paratypes:* 4 ♂, taken with the types on *Pinus edulis.* 2 ♀ Aug. 24, 1925, Estes Park, Colorado (H. H. Knight). ARIZONA—♂ July 27, 1917, Mt. Lemon, alt. 8,000 ft., Santa Catalina Mts. (H. H. Knight). ♂ ♀ Sept. 15, 1925, Santa Catalina Mts., Pima Co. (C. T. Vorhies), from "*Pinus.*"

Phytocoris umbrosus n. sp.

Suggestive of *stellatus* Van D., but much darker and more uniformly colored; distinguished by the nearly triangular right genital clasper.

♂. Length 6 mm., width 1.9 mm. Head: width 1.08 mm., vertex .30 mm. Rostrum, length 2.34 mm., reaching upon fifth ventral segment. Antennae: segment I, length 1.03 mm., brownish black, with several white glabrous spots on dorsal aspect from which arise both pale and fuscous setae, length of spines somewhat greater than thickness of segment; II, 2.43 mm., brownish black, narrowly white at base; III, 1.18 mm., black, pale at base; IV, .98 mm., black. Pronotum: length .87 mm., width at base 1.6 mm.

Dorsum clothed with fuscous simple pubescence and intermixed with white sericeous and a much smaller amount of black sericeous pubescence, many of the sericeous hairs compressed to a scale-like form; the white basal edge of pronotum with simple white hairs. Color of a dark fuscous brown, becoming more blackish on head, pronotum and scutellum, hemelytra sometimes tinged with reddish brown but devoid of maculations except for a few white dots on edge of embolium and scutellum; a white line on median line of vertex extends upon collar, xyphus, lower margin of propleura, basal edge of pronotal disk, and coxae, white.

Femora uniformly dark fuscous brown, marked with small pale dots which are scarcely larger on hind pair; tibiae dark brownish black, front and middle pair obscurely biannulate with pale, hind pair with a pale band on basal half. Membrane clouded pale, conspurcate with irregular fuscous dots and marks, darker laterally behind cuneus than within aeroles, veins reddish. Genital claspers distinctive, right clasper subtriangular, the apical angle slightly curved and with a small claw at tip.

♀. Length 5.8 mm., width 1.95 mm. Head: width 1.05 mm., vertex .42 mm. Antennae: segment I, length 1.03 mm.; II, 2.25 mm., blackish, white at base and with an obsolete pale band at middle; III, 1.21 mm.; IV, 1.08 mm. Pronotum: length .84 mm., width at base 1.6 mm. Very similar to the male in pubescence and coloration.

Holotype: ♂ August 7, 1925, Stonewall, alt. 8,000 ft., near Trinidad, Colorado (H. H. Knight); author's collection. *Allotype:* taken with the type. *Paratypes:* 3 ♂ 1 ♀, taken with the types on *Pinus ponderosa.* ARIZONA—♂ July 27, 1917, Mt. Lemon, alt. 9,000 ft., Santa Catalina Mts. (H. H. Knight). ♂ July 29, 1905, Huachuca Mts. (H. G. Barber). ♂ ♀ July 18, 1918, Williams (A. Wetmore). NEW MEXICO— ♂ Aug. 9, ♂ Aug. 13, ♂ Aug. 15, Las Vegas (H. S. Barber).

Phytocoris comulus n. sp.

Aspect of *diversus* Kngt., but the subtriangular form of the male right genital clasper indicates a closer affinity with *umbrosus.*

♂. Length 4.9 mm., width 1.8 mm. Head: width .96 mm., vertex .37 mm. Rostrum, length 2.2 mm., reaching upon the eighth ventral segment. Antennae: segment I, length .83 mm., brownish black with several glabrous white spots, from each spot arises one or two black bristles, the length of which exceed thickness of segment; II, 2.16 mm., yellowish brown, a white band at base; III, 1.09 mm., fuscous, pale at base; IV, .92 mm., fuscous. Pronotum: length 1.09 mm., width at base 1.45 mm.

Dorsum clothed with golden yellow to brown simple pubescence, becoming fuscous on pronotum, intermixed with silvery, sericeous to scale-like hairs on head, collar, between calli, basal edge of pronotum, scutellum, more thickly on mesoscutum, inner apical angles of corium, and inner basal angle of cuneus; basal margin with six tufts of black scale-like hairs. Color pale yellowish to brownish and tinged with fulvous; median line of head, more broadly on vertex, between calli, basal margin of pronotum, scutellum largely, inner apical angles of corium, some obsolete spots on embolium, lower half of face except for red marks, xyphus, lower margin of propleura, and coxae, pale to white. Cuneus and apical field of corium sometimes tinged with reddish. Membrane fuscous, irrorate and conspurcate with pale, or it might be described as pale and thickly marked with fuscous dots and marks; veins yellowish to dusky, sometimes fulvous. Legs pale, femora fuscous brown, the dark color irrorate with small and large white spots; tibiae pale, reddish brown apically, front pair with three rather narrow and more or less broken fuscous bands, spines brown. Genital claspers distinctive when taken in consideration with the other characters, right clasper subtriangular as in *umbrosus* but the apical angle is somewhat more slender.

♀. Length 4.8 mm., width 1.8 mm. Head: width .93 mm., vertex .43 mm. Antennae: segment I, length .90 mm.; II, 2.23 mm.; III, 1.12 mm.; IV, .89 mm. Pronotum: length .75 mm., width at base 1.39 mm. Very similar to the male in pubescence and coloration.

Holotype: ♂ August 13, 1925, Durango, Colorado (H. H. Knight); author's collection. *Allotype:* taken with the type. *Paratypes:* 2 ♀, taken with the types on a short leaved pine which was found growing in the semi-arid valley below Durango, probably *Pinus edulis.* COLORADO—3 ♀ Aug. 10, 1925, Fort Garland (H. H. Knight), taken on *Pinus edulis.* 2 ♂ July 21, 1903, Boulder (E. P. Van Duzee). 3 ♂ 1 ♀ July 24, 1900, Salida; ♂ July 11, 1901, Fort Collins (E. D. Ball). ARIZONA—♀ Aug. 4, 1917, Williams (H. H. Knight). 2 ♂ (teneral) July 10, 1918, Williams (A. Wetmore). ♀ Oct. 27, 1914, Anderson Mesa (E. G. Holt). ♂ June 19, 2 ♂ 1 ♀ June 20, Prescott; ♀ July 23, Williams (H. S. Barber). NEW MEXICO—♂ 2 ♀ Aug. 5, 2 ♀ Aug. 13, Las Vegas (H. S. Barber). NEBRASKA—♂ ♀ August, 1903, Glen Sioux Co. (H. G. Barber).

Phytocoris cercocarpi n. sp.

Suggestive of a small *heidemanni* Reut., but the white scale-like pubescence much more abundant than the black ones; hind femora black with dorsal and posterior aspects scarcely broken by white irrorations; genital claspers distinctive.

♂. Length 6.9 mm., width 2.1 mm. Head: width 1.17 mm., vertex .38 mm. Rostrum, length 2.84 mm., reaching to base of seventh ventral segment, pale, red on side of first segment, last two segments blackish. Antennae: segment I, length 1.21 mm., black, with four or five large white spots on dorsal aspect, set with white spines only which in length exceed slightly the thickness of segment; II, 2.93 mm., black, a narrow white band at base; III, 1.54 mm., black, pale at base; IV, 1.09 mm., black. Pronotum: length .92 mm., width at base 1.64 mm.

Dorsum clothed with simple black hairs, abundantly intermixed with white and a lesser amount of black, compressed scale-like pubescence, head and collar with a few simple white hairs and white scale-like pubescence only. Color dark fuscous to black, slightly paler on middle and apex of corium but not so clearly as in *heidemanni.* Scutellum black, irregularly irrorate with pale, the median line chiefly black where in *heidemanni* it is pale. Lobe in front of coxal cleft pale except for black mark near bottom. Membrane dark fuscous, irrorate and conspurcate with pale nearly as in *heidemanni.* Coxae and bases of femora pale; hind femora rather small for the genus, black, with a few white spots on anterior and ventral aspects, dorsal aspect with only three small dots, posterior aspect with white spots showing only along ventral margin; tibiae black, front pair with three white bands while the middle pair has four, hind pair with two incomplete white annuli near base; tarsi black. Genital claspers very distinctive, left clasper near middle with a finger-like process which appears drawn down and in contact with the slightly enlarged base (this condition is suggestive of an injured or teneral specimen but the structure is identical in all the males of the series); right clasper rather large, being very similar to that figured for *uniformis* Kngt., but the apex curved in above base of left clasper and nearly touching the angulate wall of the genital segment.

♀. Length 6.5 mm., width 2.3 mm. Head: width 1.09 mm., vertex .50 mm. Antennae: segment I, length 1.36 mm.; III, 1.55 mm.; IV, 1.09 mm. Pronotum: length .98 mm., width at base 1.83 mm. Very similar to the male in pubescence and coloration.

Holotype: ♂ August 7, 1925, Stonewall, alt. 8,000 ft., near Trinidad, Colorado (H. H. Knight); author's collection. *Allotype:* taken with the type. *Paratypes:* 11 ♂ 6 ♀, taken with the types on mountain mahogany (*Cercocarpus parvifolius*) which appeared to be the only plant on which the species occurred. ♂ August, 1921, El Paso County, Colorado (Grace O. Wiley).

Phytocoris apache n. sp.

Large size suggestive of *heidemanni* Reut., but distinguished by the biannulate second antennal segment, more decidedly grayish color, without the oblique blackish mark on apical field of corium, and by structure of the male genital characters.

♂. Length 8.6 mm., width 2.6 mm. Head: width 1.27 mm., vertex .56 mm.; pale to grayish, transverse band on middle of tylus, basal angles of tylus and extending somewhat on frons, lower margins of juga and lora, spot on middle of the strongly projecting lora, several fine oblique lines on frons, reddish brown to blackish. Rostrum, length 3.5 mm., extending upon base of fifth ventral segment. Antennae: segment I, length 2.16 mm., brown black, irrorate with small and three or four larger white spots, spines pale, in length about equal to thickness of segment; II, 3.43 mm., black, biannulate with pale, first band slightly removed from base, somewhat interrupted on ventral aspect, leaving a black annulus at base which about equals the width of the pale band, second pale annulus set at a point slightly beyond middle of segment; III, 2.13 mm., black, pale at base; IV, 1.39 mm., black. Pronotum: length 1.25 mm., width at base 2.2 mm.; basal margin slightly depressed just before basal angles.

Dorsum clothed with rather short black simple pubescence and intermixed with finer but more abundant pale sericeous pubescence, a few compressed black hairs on apical area of corium. General coloration pale testaceous to grayish and shading to fuscous on darker areas; sides of pronotum and lateral margins of disk blackish, also darker along basal margin except the white edge, a pair of tuberculate spots each side of middle on subbasal margin densely clothed with black hairs; scutellum and mesoscutum blackish, median line slenderly pale and covered with white pubescence, apical area more broadly pale each side of the dark mesal area which supports the slender and sometimes obsolete pale median line. Hemelytra shaded with fuscous on clavus and inner apical area of corium, but without an oblique fuscous mark such as occurs in *heidemanni,* claval and radial veins outlined with fuscous but interrupted in spots; cuneus with numerous small fuscous spots, the apex and inner margin more or less blackish. Membrane whitish and thickly conspurcate with fuscous much as in *heidemanni,* but the larger areole more pale than fuscous, veins fuscous, becoming white around apical half of areoles. Legs blackish and marked with pale, all femora with a rather distinct line on both anterior and posterior aspects, hind femora black on dorsal aspect and with only three or four pale marks; tibiae triannulate with pale but more or less interrupted by fuscous dots; tarsi dark fuscous. Ventral aspect chiefly fuscous, xyphus, lower margin of propleura, and mark across top of coxal cleft which continues upon head behind eye, pale; venter with numerous pale irrorations but sides and genital segment chiefly blackish. Genital characters distinctive, a rather large erect tubercle on segment wall above and far forward from base of left clasper, right side with a low wart-like tubercle in the same relative position; claspers rather simple in design, left clasper moderately thick at base and tapering gradually as it curves around apex of genital opening, right clasper linear or somewhat wedge-shaped, ventral edge margined, apex slightly hooked where it touches left clasper.

♀. Brachypterous, length 7.3 mm., width 2.6 mm. Head: width 1.32 mm., vertex .65 mm. Antennae: segment I, length 2.22 mm.; II, 3.5 mm.; III, 2.28 mm.; IV, broken. Pronotum: length .90 mm., width at base 1.63 mm. Hemelytra abbreviated, scarcely reaching upon seventh abdominal segment; cuneus rounded, with only a vestige of the membrane present on inner margin. Pubescence and coloration very similar to the male.

Holotype: ♂ June 24, 1925, Williams, Arizona, alt. 7,000 ft. (A. A. Nichol); author's collection. *Allotype:* ♀ June 19, Prescott, Arizona (H. S. Barber); U. S. National Museum collection. *Paratypes:* ♂, taken with the type. 4♂ 2♀, May 31 to June 7, Williams, Arizona (Barber & Schwarz). ♂ ♀ June 19, Prescott, Arizona (H. S. Barber). ♂ May 13, Silver City, New Mexico (J. B. Wallis).

Phytocoris hopi n. sp.

Allied to *apache* but form smaller and more slender; distinguished by the pale median line on pronotum and in structure of the male genital characters.

♂. Length 7 mm., width 1.75 mm. Head: width 1 mm., vertex .47 mm.; differs from *apache* in the V-shaped black mark on base of tylus, also tip of tylus black and more or less confluent with the band on middle. Rostrum, length

3.34 mm., reaching to base of fifth ventral segment, black, first segment pale, second segment pale to fuscous. Antennae: segment I, length 1.86 mm., black, with a few small pale spots, spines pale, length not equal to thickness of segment; II, 3.23 mm., brownish black, biannulate with pale nearly as in *apache*; III, 2.31 mm., black, pale at base; IV, 1.7 mm., black. Pronotum: length .98 mm., width at base 1.54 mm.; lateral margins of disk moderately concave; median line pale and set off with fuscous, disk fuscous with calli and a rather broad ray behind each paler, basal edge pale. Scutellum nearly as in *apache* but not so strongly convex.

Dorsum clothed with short black and white pubescence nearly as in *apache*. Hemelytra with more fuscous than in *apache,* leaving a pale area on middle and one at apex, being more or less connected by pale along outer edge of radial vein; also paler on clavus bordering scutellum and the commissure. Cuneus blackish, basal half more or less pale but with fuscous spots. Membrane dark fuscous, conspurcate and irrorate with pale, veins dusky yellow, black between the areoles. Legs nearly as in *apache* but the tibiae more distinctly triannulate with pale. Genital characters distinctive, segment wall with a small tubercle above base of left clasper which points posteriorly; left clasper much as in *apache,* but right clasper more triangular, the distal angle more slender and acuminate; a smaller tubercle above base of right clasper but of the same form and directed posteriorly as on the left side.

♀. Brachypterous, length 6 mm., width 2 mm. Head: width 1 mm., vertex .53 mm. Antennae: segment I, length 2.16 mm.; II, 3.65 mm.; III, 2.54 mm.; IV, 1.75 mm. Pronotum: length .84 mm., width at base 1.21 mm. Hemelytra abbreviated, scarcely extending beyond sixth abdominal segment; cuneus rounded, with only a vestige of the membrane present on inner margin. Pubescence and coloration very similar to that of the male.

Holotype: ♂ August 15, 1925, Dolores, Colorado (H. H. Knight); author's collection. *Allotype:* taken with the type. *Paratypes:* COLORADO—2 ♂ 2 ♀ Aug. 2–3, 1900, Dolores (E. D. Ball). ♀ Aug. 12, 1925, Pagosa Springs (H. H. Knight). 2 ♂ 1 ♀ Aug. 27, 1924, Estes Park (Drake & Hottes). ♂ Aug., 1885, Durango. ♂ Aug., 1885, Manitou. ♂, June, Platte Canyon (Oslar). ARIZONA—♀ Aug. 4, 1917, Williams (H. H.

Knight). ♀ Sept. 26, 1925, Santa Rita Mts. (A. A. Nichol). NEW MEXICO—♀ July 21, 1915, Jemez Springs (J. Woodgate). ♂ Aug. 4, Rio Ruidoso, alt. 6,500 ft., White Mts. (Townsend).

Phytocoris hesperius n. sp.

Allied to *vittatus* Reut., but distinguished by the shorter first antennal segment which is about equal to three-fourths the width of pronotum at base. In *vittatus* (type female) segment I (1.73 mm.) is almost equal to width of pronotum at base (1.77 mm.).

♂. Length 7.5 mm., width 2.4 mm. Head: width 1.08 mm., vertex .43 mm. Rostrum, length 3.15 mm., reaching upon seventh ventral segment. Antennae: segment I, length 1.5 mm., blackish, with several large and more or less confluent white spots on dorsal aspect, length of white setae greater than thickness of segment; II, 3.05 mm., fuscous, slightly paler on dorsal aspect, an obsolete pale band at slightly beyond middle, white at base but interrupted by fuscous beneath; III, 1.6 mm., fuscous, pale at base; IV, 1.03 mm., fuscous. Pronotum: length 1.06 mm., width at base 1.95 mm.

Dorsum clothed with both pale and fuscous simple pubescence, abundantly intermixed with both black and white, compressed scale-like pubescence. Coloration nearly as in *vittatus* but inner half of corium nearly uniformly fuscous without a distinct vittate mark; also with a fuscous median line on pronotal disk except between calli; scutellum more broadly pale, apex and part of median line pale with a dark ovate spot on apex surrounded by pale. Membrane with dark fuscous, thickly conspurcate with pale spots and reticulations, the largest pale spot on margin near tip of cuneus. Right genital clasper slightly curved, truncate at apex but with a small claw at middle of inner edge of apex. The claspers of this species and *vittatus* indicate a close relationship with *palmeri* Reut.

♀. Length 6.4 mm., width 2 mm. Head: width .99 mm., vertex .46 mm. Antennae: segment I, length 1.36 mm.; II, 2.93 mm.; III, 1.63 mm.; IV, .99 mm. Pronotum: length .92 mm., width at base 1.7 mm. Very similar to the male in pubescence and coloration but the vittate mark on corium is here quite distinct as in *vittatus*; yet the antennal characters distinguish the species.

Holotype: ♂ August 7, 1925, Stonewall, alt. 8,500 ft., near Trinidad, Colorado (H. H. Knight); author's collection. *Allo-*

type: June 1, 1926, Chiricahua Mts., alt. 6,000 ft., Arizona (A. A. Nichol). *Paratypes:* COLORADO—♂, taken with the type on mountain mahogany (*Cercocarpus parvifolius*). ♂ Aug. 13, 1925, Durango (H. H. Knight). ♂ July 14, 1898, Happy Hollow; ♀ June 22, 1899, Fort Collins (E. D. Ball). ARIZONA—3 ♂ 3 ♀, taken with the allotype on *Cowania* sp., the teneral condition of the specimens indicating they were reared on that plant; these specimens are smaller than the Colorado types, the dark color more strongly contrasted on a paler ground but otherwise they appear to be identical. ♀ June 7, 1926, Tucson; ♂ Sept. 26, 1925, Santa Rita Mts.; ♂ July 5, 1926, Rincon Mts., alt. 8,000 ft. (A. A. Nichol). 2 ♂ 1 ♀ Aug. 2, 1917, at top of Bright Angel trail, Grand Canyon (H. H. Knight). ♂ July 8, 1918, Williams (A. Wetmore). ♀ July 26, Williams (H. S. Barber). ♀ July 8, ♀ July 28, Huachuca Mts. (H. G. Barber). ♀ June 3, ♀ June 6, Chiricahua Mts. (H. G. Hubbard). NEW MEXICO—♂ Aug. 8, Las Vegas (H. S. Barber). WYOMING—♂ July 20–25, 1920, Yellowstone National Park (A. A. Nichol). OREGON—♂ ♀ Aug. 17, 1920, Portland (A. A. Nichol).

Phytocoris fuscosignatus n. sp.

Allied to *cunealis* Van D., but larger, more yellowish without red; distinguished by the sparsely dotted membrane, fuscous mark across corium, and the dusky yellow hind femora.

♀. Length 8.3 mm., width 2.8 mm. Head: width 1.15 mm., vertex .56 mm.; yellow, almost orange yellow above, eyes yellowish brown. Rostrum (imbedded), reaching somewhat beyond hind coxae. Antennae: segment I, length 2.07 mm., thickly clothed with erect long pale hairs, length of many greater than twice the thickness of segment; II, 3.7 mm., set with a few long dusky hairs on basal third; III, 2.01 mm.; IV, 1.33 mm.; uniformly pale, last two segments becoming dusky. Pronotum: length 1.3 mm., width at base 2.07 mm.; sides pale, disk pale to dusky, calli and between yellowish. Scutellum yellowish, mesoscutum darker. Dorsum clothed with yellowish to brown simple pubescence, a few fuscous hairs on pronotum and around the fuscous marks on corium; intermixed with shorter, more recumbent golden yellow hairs which, on the pronotum, mesoscutum and about the fuscous marks on middle of corium, are replaced by white sericeous pubescence. Hemelytra pale yellowish, the pigment more opaque on apical half; corium with an oblique fuscous mark across middle, but more or less invaded and broken by pale marks and dots, the dark area represented on apex of clavus by small fuscous spots only. Cuneus yellowish, apical two-thirds tinged with reddish; a black dot bearing black bristles is present on margin of corium bordering membrane. Membrane white, finely dotted with small fuscous marks, more thickly on basal half and on apex; a fuscous cloud is apparent on lateral margin behind cuneus; veins yellowish to reddish. Legs pale, hind femora dusky, with obsolete yellowish dots apparent, clothed with prominent pale to fuscous hairs; hind tibia with dusky band near base. Ventral surface rather uniformly pale to yellowish.

Holotype: ♀ June 26, 1926, Corvallis, Oregon (C. J. Drake); author's collection.

BOOK NOTES.

NOTES ON THE SUPPLEMENT TO LENG'S CATALOGUE OF COLEOPTERA.

By W. S. Blatchley, Indianapolis, Ind.

This supplement, just off the press, is an excellent and much needed addition to the main work, though it seems that it might have been brought up to a year or two later than December 31, 1924. There are apparently fewer errors proportionally than in the main work. This is not to be wondered at as the Catalogue proper was a stupendous task for one man, while in the preparation of the Supplement, Leng has been aided by A. J. Mutchler, the efficient Coleopterist of the American Museum of Natural History.

I have so far gone over the Supplement only as it relates to my own work between the years 1919 and 1924. It is an unwritten law that every daddy will come to the defense of his offspring when he deems them unjustly attacked—even if at times he is not able always to recognize them as they "come down the pike." The following notes are therefore given in correction of, or as stating my present viewpoint of, some of the species, which I have fathered or commented upon, and which are mentioned either by number or name in the Supplement.

18607. *Dyschirius dissimilis* Blatch. This is not a *Dyschirius* but is a species of *Clivina* and was so described.

1479. *Badister micans* Lec. There is in the Leconte collection at Cambridge an undoubted specimen of *Badister* which bears the name *micans*. Though Casey (20–206) stated that *micans* is not recognizable, that was his individual opinion. The type, so marked, is available to all students, though for specific reasons perhaps not to Casey at the time he wrote. My *B. micans* from Indiana (10–19) were compared with this type and I believe the name should stand with the Cambridge specimen as its basis.

2332. *Peltodytes* (*Cnemidotus*) *pedunculatus* Blatch. The types of this species were among a series of Haliplidae sent to Frederick Blanchard, of Tyngsboro, Mass., in 1909. He picked them out and returned them to me with the statement that they were "different from either *P. 12-punctatus* Say or *P. muticus* Lec.," and that examples were in the collection of Chris. H.

Roberts under the manuscript name of *C. pedunculatus.* Mr. Blanchard, one of the most careful and astute of American Coleopterists then living, was at that time collaborating with Roberts in the preparation of a work on North American Haliplidae, and was, therefore, making a special study of the family. He pointed out the characters distinguishing the species and I described it in the Coleoptera of Indiana under the manuscript name of Roberts. Blanchard died in 1912, and in 1913 Roberts published the "Notes on Haliplidae,"[1] in which he recognized (pp. 120–123) *pedunculatus* as a valid species. Later on one Zimmerman, a German Coleopterist, without seeing my type or, as far as I know, any specimen of the true *pedunculatus,* made it a synonym of *12-punctatus,* and his conclusion is adopted by Leng as follows: " 2332–2336 fide Zimm., 19–69." *P. pedunculatus* is without doubt a valid species and not a synonym of 2336 or anything else. The structural characters distinguishing it are well set forth by Roberts in his description (p. 120, *loc. cit.*), although the species can be at once separated from its close allies by color characters alone.

2342. *Canthydus gibbulus* Aubé. This is another species which Zimmerman in his zeal made a synonym, this time of Say's *C. bicolor.* That the two are distinct has been shown by Sharp (82–271) and by my key (19–308). Moreover, *C. floridanus* Blatch. is not a synonym of *C. gibbulus.* It is always smaller, shorter and more convex, of a darker hue and with median metasternal plate shorter, more sparsely punctate and punctures of elytra much less distinct. These characters hold good of large series without intermediate variation.

2406. *Cœlambus marginipennis* Blatch. The distinctions between this species and 2407, *C. acaroides* (Lec.), have been set forth by me (19–312) and it is not necessary to repeat them here. The two forms can be separated at a glance and no intermediates have been found.

4297. *Gyrophynus linearis* (Blatch.). This specific name as originally assigned to the genus *Xantholinus* (10–395) was valid and was so recognized in the Catalogue proper. Now, according to the vagaries and inconsistencies of our present-day system of nomenclature, it has been placed in a different genus in which there happens to be a *linearis* of prior date. Hence it has been changed by one of those European sharks (who are always on the lookout for minor prey of this kind) to *lineatus* and his name affixed as authority, though he never saw the species and therefore does not really know to what genus it belongs. Another example of this kind was my *Donacia megacornis* (No. 15205) which, in the Catalogue, was changed to *D. megalocera* Weise, because I happened to get a Latin instead of a Greek ending to the specific name. I am pleased to note that following Schaeffer (1925–113) the authors of the Supplement have restored my name.

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[1] Journ. N. Y. Ent. Soc., XXI, 1913, 92–123.

19912. *Hallomenus fuscosuturalis* Blatch. According to Schaeffer (17–359) this is a synonym of *Allopoda lutea* Hald.

19988. *Ligyrus subtropicus* Blatch. The *Ligyrus laevicollis* Bates of Casey (15–190) and other authors is not a synonym of *subtropicus,* as one would judge by the placement of that name in the Supplement, but is a very distinct form. A specimen is at hand, taken with others by W. T. Davis at Everglade, Fla., and it is in the Brooklyn Museum collection from Chokoloskee. If it is not the *laevicollis* of Bates it is, as yet, probably unnamed.

20188. *Colaspidea insularis* Blatch. This species was described from the Isle of Pines, Cuba, and not from Florida. The specimens were received from Prof. J. R. Watson, to whom they had been sent by citrus growers on the Isle of Pines for identification.

15895d. *Disonycha parva* Blatch. This will without doubt prove to be a valid species and not a variety of *pennsylvanica.* In long series from both Indiana and Florida the length is uniformly but about two-thirds that of *pennsylvanica,* and the elytra are always darker, non-alutaceous, and more strongly bisulcate along the median stripe. Frederick Knab once wrote me that in his opinion this small form is the typical *pennsylvanica* of Illiger. If this should prove to be true, the larger, paler and more common form at present going under that name would have to be known as *uniguttata* Say, which is apparently the oldest of a number of synonyms.

EDITORIAL.

UNKIND WORDS ON REPRINTS.

One of the greatest conveniences of modern scientific writings is the reprint. It has many virtues, of which we enumerate but two: The one, its economy, for one may accumulate reprints on any given subject at a moderate cost—a matter of great importance to the private worker, who can afford neither the cost of nor the room for complete sets of *all* the journals in which the matters that interest him appear; and the other, its invaluable convenience, for all the data on any subject may be handily assembled in one convenient group, without the necessity of having innumerable bound and heavy tomes scattered about.

But reprints have serious drawbacks to their more extended use and greatly enhanced value. We have three reprints before us which illustrate one difficulty of magnitude—all three from journals of standing, two published in this country and one abroad. One of them (and from a most important publication) succinctly gives the name of the publication, the number of the journal and the *exact* date of publication—*but nowhere has it a page number.* Another gives the journal volume and the year, but numbers the reprint pages 1–4; and lets it go at that! The third separate gives right at the top of the first page the name of the publication, the volume number, the pages, the month and the year; and otherwise is exactly as it appeared in the journal.

Now, in these days when so much depends on the exact date in the matter of description of new species—all three reprints are taxonomic and one is also synonymic—the very unfortunate idea of omitting pagination is highly reprehensible; or so it seems to the writer. Possibly the underlying thought is to oblige students to consult the original tomes—but scientists in their most human moments are unchancy kittle-cattle, and won't be driven. Therefore, why not contribute to peace and concord and also facilitate the use of reprints as source material, by making reprints *exact* facsimiles of the original? This is not only easy to do, but it is also less costly.

The reprint is bound to be in the immediate future one of the most useful necessities in the entomological library, whether public or private. Why not make it so at the outset and save wear and tear of the bibliographer's mind and temper?—J. R. T.-B.

ON CONTROVERSIAL ITEMS.

In our December number we published a critique of Dr. W. S. Blatchley's recent work; in this, we print Dr. Blatchley's rejoinder. There is in these two a certain noticeable acidity which is not quite germane to even-tempered scientific comment. But, as Dr. Blatchley has felt aggrieved by what has heretofore appeared in criticism of Heteroptera of Eastern N. A., we felt—and feel—that in fair justice he was entitled to his little day in court. We believe, notwithstanding, that whoever puts himself on record in print must abide by the consequences, be they what they may. Therefore, since Dr. Blatchley has set forth certain conclusions which those who deem themselves competent to pass upon them consider to be wrong, or at least highly controversial, he must expect—and should welcome—open criticism, even though it may appear to him to be harsh and seemingly lacking in the urbanities of polite intercourse.

We firmly believe that in the interests of science any divergences or erroneous or controversial points in Dr. Blatchley's extensive work must be corrected *now*. This book of his is a compendium of American hemipterology and as such is bound to be much used for ready reference. Therefore, all emendations should be available to students at this present moment, before any controversial matters are perpetuated as facts accepted by hemipterologists.

But this being said, this journal will not be able to afford room to matters reflecting on personalities or with a tinge of acrimony and personal feeling. As we have already published commentary on certain parts of Dr. Blatchley's work, we hope to publish all others that may present themselves. But we reserve the absolute right to eliminate any harsh or aggressive comments, in our editorial discretion, and in all friendship to our contributors.

NOTICE.

Title page and Index to volume XXII will appear with the April number.

EXCHANGES.

This one page is intended only for wants and exchanges, not for advertisements of articles for sale. Notices not exceeding THREE lines free to subscribers. Over lines charged for at 15 cents per line per insertion.

Old notices will be discontinued as space for new ones is needed.

SCOLIA AND CAMPSOMERIS wanted from all regions of world, will determine, exchange or purchase. J. C. Bradley, Cornell University, Ithaca, N. Y.

WE WISH to procure in exchange or on cash: *Parnassius of North-America,* with his varieties and aberrations, well labelled, spread or in papers (clodius, smitheus, eversmanni). Dr. Staudinger & A. Bang-Haas, Dresden-Blasewitz.

THE MUSEUM of the Brooklyn Institute has a few uncolored sets of the Calverly, Weidenmeyer and Edwards plates of North American Sphingidae for exchange or for sale at $5 per set. Address, Librarian, Brooklyn Museum, Eastern Parkway, Brooklyn, N. Y.

LEPIDOPTERA from the Mountains of Kentucky. Papilios and other var. of this section collected. Paper spec. of *Xylophanes tersa* and *Catopsilia eubule* on hand. Also Cocoons of the larger Saturnid moths. Ellis Chandlee, Barbourville, Ky.

BUTTERFLY COLLECTORS.—Have you aberrations or freak butterfly specimens for sale or exchange? Professional and private collectors please write. Jeane Gunder, Pasadena, Calif.

NEW ARRIVALS.—From Colombia, French Guiana, and Brazil. Brilliant tropical Lepidoptera for scientific and decorative purposes. H. S. Parish, 14 Briarcroft Road, Toronto, Ont., Canada.

CYNIPIDAE.—Galls and bred wasps wanted to determine or in exchange. Alfred C. Kinsey, Indiana University, Bloomington, Indiana.

WANTED.—Am studying the bionomics of the corn billbugs and desire the privilege of examining *Calendra* (*Sphenophorus*) from all parts of the world. A. F. Satterthwait, U. S. Entomological Laboratory, Webster Grove, Mo.

DIURNAL LEPIDOPTERA.—Have many desirable western species to exchange, including *Argynnis atossa, macaria, mormonia, malcolmi, nokomis; Melitaea neumoegeni; Lycaena speciosa;* etc. Send lists. Dr. John A. Comstock, Southwest Museum, 4699 Marmion Way, Los Angeles, Calif.

WANTED.—Ants from all portions of the United States for determination or exchange. Will also exchange other insects for ants. M. R. Smith, Assistant Entomologist, State Plant Board, A. and M. College, Miss.

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Vol. XXIII April, 1928 No. 2

THE DIPLOPTEROUS WASPS OF FABRICIUS, IN THE BANKSIAN COLLECTION AT THE BRITISH MUSEUM

By J. Bequaert,

Department of Tropical Medicine, Harvard University
Medical School.

During a recent visit at the British Museum, I was able to examine the diplopterous wasps of the Banksian Collection, which (it is well known) contains many of the types described by Fabricius. Owing to lack of time, some of the specimens could not be studied as completely as might be desired. Yet I believe that the following notes will elucidate several critical points.

As far as I know, the only reference in print to the Diploptera of the Banksian Collection, is H. de Saussure's brief account in the third part of his monograph (1856, Etudes Fam. Vespides, III, Suppl., pp. 106–107). His examination appears to have been quite hurried and he does not seem to have compared specimens of his own species. In the present paper, I have noted in each case whether or not de Saussure's conclusions agreed with mine. A few of the specimens were later examined by the late G. Meade-Waldo, and his results were published in sundry papers. Sometimes they were merely incorporated in his arrangement of the general collection at the British Museum.

For the convenience of the taxonomist, I have divided the species studied into three groups. Otherwise I have followed the sequence of the collection in its present condition. It appears to have been arranged by Frederick Smith, shortly after it was deposited in the British Museum. The references to Fabricius' works are abbreviated to the year of publication, followed by the page:

1775: Systema Entomologiae.
1781: Species Insectorum, I.
1787: Mantissa Insectorum, I.
1793: Entomologia Systematica, II.

Unless otherwise stated, the specimens bear no locality labels. With few exceptions, they are remarkably well preserved.

Of the several wasps described by Fabricius from the Banksian Collection, the only species not represented at the British Museum is *Vespa cinerea* Fabricius, 1793, II, p. 279. This is a synonym of *Belonogaster junceus* (Fabricius) and appears to have been based upon the same specimen as *Vespa juncea* Fabricius.

I. TRUE TYPES OF DIPLOPTERA DESCRIBED BY FABRICIUS.

1. *Vespa ephippium* Fabricius, 1775, p. 362=**Abispa ephippium** (Fabricius). The holotype is a female.[1]

2. **Vespa analis** Fabricius, 1775, p. 363. The holotype is a female.

3. **Vespa arenaria** Fabricius, 1775, p. 365. The species is there described from "Mus. Banks" and the specimen in the collection fits the description exactly. This holotype is a small worker, with long oculo-malar space, and nothing but the common North American species, which H. de Saussure described as *Vespa diabolica.* Fabricius' name has priority. R. du Buysson [1905, Ann. Soc. Ent. France, LXXIII, (1904), p. 571] first suggested the possible identity of *diabolica* with *arenaria.* This identity seems to have been recognized by the late Meade-Waldo also, for, in the general collection at the British Museum, *V. diabolica* de Saussure is placed under the label *V. arenaria* Fabricius.

H. de Saussure (Et. Fam. Vesp., III, p. 107) wrote: "*Polistes arenaria* Fabricius=*Vespa arenaria* ? m." But this was certainly an error. His *Vespa arenaria* he placed in the group of species with "yeux atteignant la base des mandibules" (what is now the subgenus *Vespula* Thomson). Fabricius' *Vespa arenaria* belongs in the subgenus *Dolichovespula* Rohwer.

Vespa arenaria H. de Saussure (1853-1855, Et. Fam. Vesp., II, p. 134) (not of Fabricius) is a synonym of *Vespa communis* H.

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[1] According to verbal information received from Mr. R. E. Turner, the Australian insects of the Banksian Collection were all collected during Captain Cook's voyage, while his ship was being repaired on the coast of Queensland, at a place now called Cookstown.

de Saussure (1857, Stettin. Ent. Zeitg., XVIII, p. 117). That name being preoccupied by *Vespa communis* Schrank (1785, Neue Mag. Liebh. Ent., II, p. 328), the next available name for this common yellow-jacket of eastern North America is *Vespa maculifrons* R. du Buysson (see Rohwer, 1926, Proc. Ent. Soc. Washington, XXVIII, pp. 93-94).

4. *Vespa aestuans* Fabricius, 1781, I, p. 462=**Synagris aestuans** (Fabricius). The holotype is a female.

5. *Vespa haemorrhoidalis* Fabricius, 1775, p. 366=**Odynerus (Rygchium) haemorrhoidalis** (Fabricius). The holotype is a female.

6. *Vespa albifrons* Fabricius, 1775, p. 366 = **Paralastor albifrons** (Fabricius), as recognized by H. de Saussure (Et. Fam. Vesp., III, p. 335). The holotype is a male. This appears to be a species of *Paralastor* differing from any of those studied by R. C. L. Perkins (1914, Proc. Zool. Soc. London, pp. 563-624; and 1914, Ann. Mag. Nat. Hist., (8) XIV, pp. 235-240).

7. *Vespa rufipes* Fabricius, 1775, p. 367 = **Odynerus (Rygchium) rufipes** (Fabricius). The holotype is a female. The species was correctly recognized by H. de Saussure.

8. *Vespa tecta* Fabricius, 1781, I, p. 466 = **Odynerus (Rygchium) tectus** (Fabricius). The holotype is a female.

This insect agrees structurally with *Odynerus* (*Rygchium*) *rhynchoides* H. de Saussure (1852, Et. Fam. Vesp., I, p. 174, male; Senegal), which I must regard as a color phase of *O. tectus.*

The type of *Vespa tecta* shows the following morphological peculiarities: Clypeus pyriform in outline, but more narrowed toward the apex than in *Odynerus falcatus* Tullgren; covered with heavy, irregular, longitudinal striae, among which are scattered deep punctures. Thorax, seen from above, much longer than wide. Mesonotum without carinae. Postscutellum without projecting spines or tubercles; its vertical and horizontal portions separated by an arcuate, quite blunt ridge, which is finely crenulate. No horizontal area behind the postscutellum.

Propodeum: superior ridges very high, sharp, translucent, separated from the postscutellum by a deep notch, where the lamella of the superior ridge ends in a pointed angle; lateral angles quite prominent, tooth-like, but with blunt apex; lateral and inferior ridges well marked, but not lamelliform; concavity transversely striate; dorsal areas almost wholly covered with very large punctures. Second abdominal sternite uniformly and moderately convex in profile, with a brief, shallow, but distinct, longitudinal furrow at base. First and second abdominal tergites almost uniformly covered with scattering, medium-sized punctures; they are somewhat denser on the slightly depressed, apical third of the second tergite, as well as on the succeeding tergites. The size is approximately that of *O. rhynchoides.*

The pattern of Fabricius' type is much the same as that of *O. rhynchoides,* but the yellow color is replaced by ferruginous. The abdomen is ferruginous above, except for the black base and a broad, median, black stripe over the dorsum, the stripe expanded to the sides over the basal fourth of the second tergite (thus forming a black cross). The wings are almost wholly violaceous black, with ferruginous costa, thus differing conspicuously from those of *O. rhynchoides.*

In Meade-Waldo's key to the Ethiopian species of *Odynerus* [1915, Trans. Ent. Soc. London, (1914), p. 494], there are two important errors with regard to *O. tectus.* The description of the color pattern is misleading. Furthermore the species is placed among those having "no fissure separating median segment from postscutellum"; *O. rhynchoides* being inserted under the clause: "Upper angles of median segment separated from sides of postscutellum by a distinct fissure." As a matter of fact, in Fabricius' type of *tectus* the notch in question is quite deep and wide and not different from that found in *rhynchoides.*

Between *O. tectus* (Fabricius) (with its var. *rhynchoides* H. de Saussure) and *O. pseudo-lateralis* Meade-Waldo, there are slight morphological differences, which appear to be of specific value. The lateral angles of the propodeum, as well as its lamellate superior ridges differ. Yet these two species certainly are closely related.

9. *Vespa bicincta* Fabricius, 1781, I, p. 465=**Pachymenes bicinctus** (Fabricius). The holotype is a female. The erroneous locality "Cap bon. sp.," given in the original description explains why this peculiar little wasp has not been recognized thus far. Owing to the narrowed, but short, cup-shaped first abdominal segment, which is distinctly set off from the remainder of the abdomen, this species should be placed in *Pachymenes.*

It has been redescribed three times as new: *Odynerus rarotongae* Meade-Waldo (1910, Ann. Mag. Nat. Hist., (8) VI, p. 107, female and male; Rarotonga, Cook Islands) and *Odynerus* *sarasini* A. v. Schulthess (1915, Nova Caledonia, Zool., II, 1, p. 50, Fig. 2, female; New Caledonia) are synonyms of *Vespa bicincta* Fabricius. According to H. de Saussure, *Odynerus bizonatus* Boisduval (1835, Voyage de l'Astrolabe, Faune Entom. Océan Pacifique, II, p. 658; Tonga-Tabu, Tonga Islands; Atlas, Pl. XII, Fig. 5) likewise is a synonym of *Vespa bicincta.* Certainly the insect described by H. de Saussure (1852, Et. Fam. Vesp., I, p. 156, female and male) as *Odynerus bizonatus* is Fabricius' species. Meade-Waldo recognized that his *O. rarotongae* was a synonym of *Vespa bicincta* Fabricius.

Both structure and coloration are characteristic and are well described by Meade-Waldo and A. v. Schulthess. The body is very smooth, almost impunctate; the propodeum likewise smooth, with all ridges and angles rounded off. Body black, with a number of pale yellow spots on head and thorax (two basal spots on the clypeus; a dot on each outer orbit, above; a spot on each side of pronotum, scutellum and propodeum, making six dorsal spots on the thorax; a spot on each side beneath the base of the wing), and a narrow, continuous, yellow, apical fascia on first tergite and on second tergite and sternite. Legs almost entirely ferruginous. Wings hyaline, the anterior half of fore wing purplish infuscate.

10. *Vespa radula* Fabricius, 1787, I, p. 290. Under this name there are in the collection two females, one of which may be Fabricius' true holotype. These specimens, however, are not marked "types." They represent two different species of *Odynerus,* neither of which is known to me.

11. *Vespa lanio* Fabricius, 1775, p. 365 = **Polistes canadensis** (Linnaeus), as recognized by H. de Saussure. The holotype is a female from Brazil. This insect appears to be the typical color phase of *P. canadensis,* since it is without yellow markings, and even lacks the apical fascia of the first tergite.

12. *Vespa schach* Fabricius, 1781, I, p. 461 = **Polistes schach** (Fabricius). The specimen labelled "type" in the Banksian Collection is a female of "Australia." It is a large, entirely ferruginous brown *Polistes,* with a distinct prepectal suture and an impressed line dividing the mesepisternum. It is an entirely different wasp from *Polistes schach* H. de Saussure (1853–1855, Et. Fam. Vesp., II, p. 50), de Saussure's species being *Polistes confusus* F. Smith. Later, after examining Fabricius' type, H. de Saussure recognized his error and stated that *Polistes schach*

(Fabricius) = *Polistes humilis* H. de Saussure, 1853-1855, Et. Fam. Vesp., II, p. 52 (not *Vespa humilis* Fabricius). At present I regard *P. confusus* as distinct from *P. orientalis* (Kirby).

13. *Vespa humilis* Fabricius, 1781, I, p. 461 = **Polistes humilis** (Fabricius). There are two specimens labelled "type," a female and a male, both undoubtedly belonging to the same species. I have seen a number of specimens, agreeing with Fabricius' types, in a collection of insects recently made by Mr. J. G. Myers in New South Wales. There is no prepectal suture and the mesepisternum is not divided by an impressed line. H. de Saussure synonymized his *Polistes tasmaniensis* (1853–1855, Et. Fam. Vesp., II, p. 66, Pl. VI, Fig. 6, female and male; Australia) with *Polistes humilis* (Fabricius), and this appears to be correct. Fabricius' male may be selected as the holotype, since the species of *Polistes* are best characterized in that sex. The female will then be the allotype.

As noted above, *Polistes humilis* H. de Saussure is a different species and a synonym of *Polistes schach* (Fabricius), according to H. de Saussure.

14. *Vespa tepida* Fabricius, 1775, p. 366 = **Polistes tepidus** (Fabricius), as recognized by H. de Saussure. The holotype is a female. It agrees with the current idea of that Australian species.

15. *Vespa carnifex* Fabricius, 1775, p. 365 = **Polistes carnifex** (Fabricius), as recognized by H. de Saussure. The holotype is a female. Structurally this specimen agrees with the current idea of this South American wasp. There is no prepectal suture; but the mesepisternum is completely divided by an impressed line. The oculo-malar space is very long, over one-third the length of the eye. The head is much swollen. The clypeus does not touch the inner orbits.

16. *Vespa marginalis* Fabricius, 1775, p. 367 = **Polistes marginalis** (Fabricius), as recognized by H. de Saussure. The holotype is a female and agrees with the current idea of this species.

17. *Vespa variabilis* Fabricius, 1781, I, p. 466 = **Polistes humilis** (Fabricius) var. **variabilis** (Fabricius). The holotype is a male, which agrees structurally with *P. humilis*. I regard it as a color phase of that species, differing in the abundant yellow markings. H. de Saussure's *Polistes variabilis* (1853–1855, Et. Fam. Vesp., II, p. 66) was described from Fabricius' type and is the same insect.

18. *Vespa macaensis* Fabricius, 1793, II, p. 259 = **Polistes macaensis** (Fabricius), as recognized by H. de Saussure. Two females of the lighter colored form, very abundantly marked with yellow. These specimens are not marked as types, but I believe one of them is the true holotype, since Fabricius described the species from "Mus. Dom. Banks."

19. *Vespa tabida* Fabricius, 1781, I, p. 468 = **Polybioides tabida** (Fabricius). The holotype is a female, which agrees with the current idea of this species. H. de Saussure saw Fabricius' type, when he described *Polybia tabida* (1853–1855, Et. Fam. Vesp., II, p. 209).

20. *Vespa lateralis* Fabricius, 1781, I, p. 466 = **Odynerus (Rygchium) lateralis** (Fabricius). There are two specimens labelled *"Vespa lateralis"* in the Banksian Collection. As pointed out by Meade-Waldo [1915, Trans. Ent. Soc. London (1914), p. 512], H. de Saussure selected as "type" the wrong specimen, which does not agree in size with Fabricius' original description. The true holotype is a female agreeing with my description of *Odynerus lateralis* (1918, Bull. Amer. Mus. Nat. Hist. XXXIX, p. 180). *Odynerus truncatus* H. de Saussure (1852, Et. Fam. Vesp., I, p. 175, female and male) is a synonym.

I had also regarded *Rygchium furax* Kohl (1894, Ann. Naturh. Hofmus. Wien, IX, p. 339, female and male), as being the same species; but a female received from the Vienna Museum under this name differs in a number of morphological details. This specimen, however, came from Senegal and therefore was not part of the original lot, which included specimens from Gaboon and Khartoum. If the Senegal female is correctly identified, *Odynerus* (*Rygchium*) *furax* (Kohl) is more closely allied to *O. angolensis* Radoszkowsky (as redescribed by me in 1918) than to *O. lateralis* (Fabricius), although conspicuously different in coloration. The first abdominal tergite is almost impunctate, bearing but very few, exceedingly fine punctures. On the second tergite the punctures are more numerous, though still scattering and shallow; they are found all over the tergite, but are farther apart on the median, anterior area. Clypeus, front, and vertex are dull, but show exceedingly sparse and fine punctures. The apex of the clypeus is deeply, semicircularly emarginate, with sharp carinate lateral angles. The surface of the clypeus is but slightly uneven. Fovea of the vertex small, shallow, bare, smooth and shiny. Puncturation of pronotum and mesonotum shallow and remote, though more abundant than on the vertex; the surface of these parts dull. Postscutellum divided into two broad lobes, separated by a shallow depression, and crenulate-denticulate along the raised edge. Second sternite broadly flattened, the basal three-quarters slightly concave in the middle and with a mere trace of longitudinal groove at the base.

The second, more robust, specimen placed in the Banksian Collection under *Vespa lateralis,* is a female with the anterior portion of the thorax smooth and shiny. It belongs to *Odynerus* (*Rygchium*) *marginellus* (Fabricius) (= *Vespa africana* Fabricius, 1804, Syst. Piezat., p. 257; *Rhygchium laterale* H. de Saussure, 1856, Et. Fam. Vesp., III, p. 171; *Rygchium africanum* H. de Saussure, 1852, Et. Fam. Vesp., I, p. 108). Fabricius described his *Vespa marginella* (1793, II, p. 263), from a specimen in the Banksian Collection, but at present there is no longer any specimen in that collection labelled "*marginella.*" I suggest that the larger of the two specimens labelled "*Vespa lateralis*" was originally the type of "*Vespa marginella,*" but was inadvertently provided with a wrong label.

21. *Vespa macilenta* Fabricius, 1781, I, p. 466 = **Belonogaster** sp. The holotype is a male. R. du Buysson (1909, Ann. Soc. Ent. France, LXXVIII, p. 247) regarded this as a synonym of *Belonogaster griseus* (Fabricius), but he did not see Fabricius' type. He appears merely to have followed H. de Saussure, who identified the type of *V. macilenta* with *Belonogaster rufipennis* H. de Saussure. The specimen seems to be rather too small and too slender for *B. griseus.* It should be compared with several other described species of *Belonogaster.*

22. *Vespa grisea* Fabricius, 1775, p. 372 = **Belonogaster griseus** (Fabricius). The holotype is a female agreeing with the current idea of the species. H. de Saussure recognized that it was the wasp which he described as *Rhaphigaster rufipennis* (1853–1855, Et. Fam. Vesp., II, p. 15, Pl. II, Fig. 6).

23. *Vespa juncea* Fabricius, 1781, I, p. 468 = **Belonogaster junceus** (Fabricius). The holotype is a female agreeing with the current idea of the species.

24. *Vespa cyanea* Fabricius, 1775, p. 372 = **Synoeca cyanea** (Fabricius). A female not marked as type, but which I believe is the holotype, since the species was described from "Mus. Banks."

25. *Vespa petiolata* Fabricius, 1781, I, p. 467 = **Eumenes pyriformis** (Fabricius). A male, which is not marked as type, but which I regard as the holotype, since *V. petiolata* was described from "Mus. Dom. Banks." I follow W. A. Schulz (1912, Berlin. Ent. Zeitschr., LVII, p. 88) in regarding *Vespa pyriformis* Fabricius, 1775, p. 371, as cospecific with *V. petiolata* Fabricius.

26. *Vespa campaniformis* Fabricius, 1775, p. 371 = **Eumenes campaniformis** (Fabricius). The holotype is a female. It agrees with my idea of the typical form of that species (1926, Ann. South Afric. Mus., XXIII, 3, p. 541). H. de Saussure referred it to *Eumenes esuriens* (Fabricius), which is a color phase of *Eumenes campaniformis.*

27. *Vespa arcuata* Fabricius, 1775, p. 371 = **Eumenes arcuatus** (Fabricius). The holotype is a female agreeing with the current idea of the species, as recognized by H. de Saussure.

II. DIPLOPTERA NOT OR APPARENTLY NOT TYPES OF FABRICIAN SPECIES.

28. *Vespa cornuta* Fabricius, 1775, p. 363 = **Synagris cornuta** (Linnaeus). A male.

The reference to Systema Piezatorum (1804, p. 252) given in a former paper (1918, Bull. Amer. Mus. Nat. Hist., XXXIX, p. 326) should be corrected, since in that work the species is described as *Synagris cornuta.*

29. *Vespa crabro* Fabricius, 1775, p. 364 = **Vespa crabro** Linnaeus. A female.

30. *Vespa vulgaris* Fabricius, 1775, p. 364 = **Vespa vulgaris** Linnaeus. A female.

31. **Vespa cincta** Fabricius, 1775, p. 362. The specimen labelled "type" in the Banksian Collection is a female; but it is not the true holotype, since it was described by Fabricius as a variation of *V. cincta*: "Varietas minor thorace immaculato, e Capite Bonae Spei. Mus. Banksianum."

32. *Vespa maculata* Fabricius, 1775, p. 364 = **Vespa maculata** Linnaeus. A worker.

33. *Vespa calida* Fabricius, 1775, p. 366 = **Odynerus (Rygchium)** sp. with the type of coloration exhibited by *Synagris calida* (Linnaeus). A female. According to H. de Saussure it is

Synagris minuta H. de Saussure (=*Synagris abyssinica* Guérin), but I cannot agree with this identification.

34. *Vespa uncinata* Fabricius, 1775, p. 367 = **Monobia quadridens** (Linnaeus). A male and a female, which agree perfectly with Fabricius' original description.

35. *Vespa parietum* Fabricius, 1775, p. 368 = **Ancistrocerus** sp., related to *A. callosus* (Thomson). A female.

36. *Vespa spinipes* Fabricius, 1775, p. 368 = **Ancistrocerus** sp., related to *A. callosus* (Thompson). A male.

37. *Vespa bidens* ? Fabricius, 1775, p. 368 = **Ancistrocerus** sp. A male.

38. *Vespa annularis* Fabricius, 1775, p. 366 = **Polistes annularis** (Fabricius). Two females, which are not the types.

39. *Vespa gallica* Fabricius, 1781, I, p. 460 = **Polistes gallicus** (Fabricius). A female, which is not the type.

40. *Vespa coarctata* Fabricius, 1775, p. 370 = **Zethus** sp. A female, not marked as type. It is not *Vespa coarctata* Linnaeus. According to H. de Saussure, Fabricius' specimen is *Zethus pyriformis* H. de Saussure.

III. NON-DIPLOPTEROUS WASPS DESCRIBED BY FABRICIUS AS *Vespa*.

41. *Vespa tricincta* Fabricius, 1775, p. 363 = **Sphecius speciosus** (Drury, 1773). The holotype is a female.

42. *Vespa concinna* Fabricius, 1775, p. 367 = **Hylaeoides concinnus** (Fabricius), as recognized by H. de Saussure. A female, which appears to be the holotype, although it is not marked as type in the collection.

43. *Vespa serripes* Fabricius, 1781, I, p. 464 = **Cerceris serripes** (Fabricius), as recognized by H. de Saussure. The holotype is a male. As pointed out to me by Mr. R. E. Turner, this is the common North American species subsequently described by Guérin-Meneville as *Cerceris bicornuta* (1845, Iconogr. Règne Anim., VII, Insect., p. 443). There appears to be no reason why Fabricius' earlier name should not be used for this wasp.

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griseus, 21, 22.
haemorrhoidalis, 5.
humilis, 12, 13, 17.
junceus, 23.
lanio, 11.
lateralis, 20.
macaensis, 18.
macilenta, 21.
maculata, 32.
maculifrons, 3.
marginalis, 16.
marginellus, 20.
minuta, 33.
orientalis, 12.
parietum, 35.
petiolata, 25.
pseudo-lateralis, 8.
pyriformis, 25, 40.
quadridens, 34.
radula, 10.
rarotongae, 9.
rhynchoides, 8.
rufipennis, 21, 22.
rufipes, 7.
sarasini, 9.
schach, 12, 13.
serripes, 43.
speciosus, 41.
spinipes, 36.
tabida, 19.
tasmaniensis, 13.
tectus, 8.
tepidus, 14.
tricincta, 41.
truncatus, 20.
uncinata, 34.
variabilis, 17.
vulgaris, 30.

THE OCCASIONAL APPEARANCE OF THE SEVENTEEN-YEAR CICADA IN THE FALL, AND BROOD NO. 1 ON LONG ISLAND, N. Y., IN 1927.

By Wm. T. Davis, Staten Island, N. Y.

In the Journal of the N. Y. Entomological Society for December, 1910, the writer described a visit to the Half Way Hollow Hills near Wyandanch, Long Island, and the observations he had made on the seventeen-year cicadas occurring there in the summer of that year. In 1910 Brood No. 1 of *Magicicada septendecim* L. occurred in localities to the south and southwest of New York and New Jersey, and so the appearance of the brood on Long Island, where it was not expected, was of much interest.

The Half Way Hollow Hills were visited in 1911 when the extensive Brood 2 was appearing in the valley of the Hudson and over nearly the entire state of New Jersey, but only a few isolated individuals could be recorded. So the year 1927 was awaited with much interest; would the cicadas again be found in the Half Way Hollow Hills as in 1910? The Hills were visited on June 9, 1927, in company with Mr. John M. Farley, Jr., and the locality where the cicadas occurred in 1910 was examined. Many pupae skins were found and a few adults, which were soft and immature. None was heard singing.

On June 17 the cicadas were sufficiently numerous to produce a continuous song, and certainly sufficiently numerous to continue the colony for another 17 years. On this occasion I was surprised to see a cicada dangling from the branch of a bush about five feet above the ground, and upon a nearer approach discovered that it had been captured by a comparatively small crab-spider that was holding the now dead cicada by the head, as it dangled from the bush. The cicada was not very hard, and the spider had no doubt killed her, for it was a female, shortly after she had emerged from the pupa skin. The spider was identified as *Xysticus ferox* Hentz, which has been confirmed by Prof. C. R. Crosby, with the added information that it is a mature female.

On June 21, 1927, the cicada colony was visited once more, and as the day was bright and warm the insects were in full song and very active. Away from the colony, which is a short distance to the north of the place where the cross-country telegraph line crosses Burr Lane, the cicadas were far less numerous.

Later in the season I received a letter from Mr. Albert A. Arnold, who had located another colony of Brood 1 on Long Island. Mr. Arnold wrote: "I travel a great deal from Lindenhurst to Riverhead and in going through the Middle Island Road and stopping near Camp Upton on the day in question, as my car slowed down, I heard such a loud humming noise and sort of rasping sound that I spoke to my associate, who was with me, and said it sounded as if something was wrong with my motor. However, I soon discovered that it was not in the motor, but in the outdoors and I soon traced the sound to great quantities of cicada which were simply covering all the scrub oaks which are in that locality. It seemed as if there was considerable territory being occupied at that time by this brood. . . . The location of this spot is on the Middle Island Road from Coram going towards Riverhead and it is on the flat portion of land, just after you pass the road which formerly led into Camp Upton property and extended for quite some distance on both sides of this road."

It appears from the foregoing that the range of Brood 1 of the 17-year cicada should be extended to the northeast to include these Long Island colonies.

We now come to the occasional appearance in the fall of the 17-year cidada. In 1885 an acrimonious discussion occurred between the botanist, Prof. Lester F. Ward, who stated that he had heard a 17-year cicada singing on October 12, 1884, near Clifton Station, Virginia, and Dr. C. V. Riley, who thought, owing to the lateness of the date, that it was likely some other species of cicada. The printed portion of this controversy will be found in *Science* for June 12 and July 3, 1885, and the Scientific American Supplement, August 15, 1885. In the Journal of the N. Y. Entomological Society for December, 1919, and March, 1925, the writer recorded the capture of two specimens of the small form *cassinii* Fisher at Ames, Iowa, October 11, 1912, and Luray, Missouri, October 15, 1919. To this may now be added some very interesting facts contributed by Colonel Wirt Robinson, of West Point, N. Y. Under date of September 26, 1927, he wrote that on the preceding day he had heard a 17-year cicada on the Reservation near the Bear Mountain Park line. The insect was in a small oak about 30 feet high. October 2 was a very warm day at West Point and Colonel Robinson while at a locality about a half mile further down the ridge from the place where he had heard the cicada on September 25, heard another one singing and directly saw it light in a knee-high choke cherry. He continues: "I had to climb up a steep rock to reach the bush and when I got to it, did not see the locust which was within a few inches of my hand, until it flew some twenty feet and lit on a branch of an oak about eight feet from the ground. Had a good look at it. Saw its red eyes and reddish-yellow wing veins and listened to it sing." On October 5, 1927, Col. Robinson added: "Nelson Lewis, a farmer up near where I was to-day, said he heard last Sunday several 17-year locusts near his home, and this is over two miles from where I let the one escape me."

There is no doubt from these records that an occasional 17-year cicada does appear in the fall of the year, especially may this happen where the cicadas are to appear as a brood the following year.

In 1885 Brood 10 appeared about Washington following the record for the October, 1894, individual by Prof. Ward, and in June, 1928, the cicadas will appear in vast numbers at West Point, as they did in June, 1911.

NOTICE!

ENTOMOLOGICA AMERICANA.

This revived journal published by our Society is now about to complete the second volume of the second series. Purposely we have issued an edition of each number limited to 200 copies. Accordingly, as time goes on, our publication will become rarer and more costly. We urge our readers who are interested in the larger aspects of entomology to send in their subscriptions now, which we will fill from volume vii at the regular price, for a limited time only—or rather, until our supply is exhausted up to our reserve. This will occur soon, as our present subscribers absorb 75% of our issues.

This thought is commended particularly to libraries and institutions.

BOISDUVAL TYPES OF AEGERIIDAE IN THE WM. BARNES COLLECTION OF N. A. LEPIDOPTERA.

By Geo. P. Engelhardt, Brooklyn Museum.

Dr. Wm. Barnes, of Decatur, Ill., under date of February 17, submitted to me for examination a number of specimens of North American Aegeriidae which he acquired from the Oberthür collection.

This acquisition by Dr. Barnes proves to be of great importance, inasmuch as all the specimens, except two, bear labels indicating that they are types and of certain species which, because of the meager descriptions and the assumption that the types were lost, could not be determined and have been ignored. These type specimens, checked up with Boisduval's original descriptions, establish beyond a doubt which species he had in hand; and a matter of long standing confusion in nomenclature can now be straightened out.

Sesia bibionipennis Boisduval.

Ann. Soc. Ent. Belgique, Vol. XII, p. 64, No. 65, 1869. "California. Taken in flight in the woods."

The type is a male of the strawberry root borer. *Synanthedon rutilans* Hy. Edw.—Papilio, Vol. 1, p. 186, 1881.

S. bibionipennis must be retained for reasons of priority and *S. rutilans* falls into synonymy.

Sesia chrysidipennis Boisduval.

Ann. Soc., Ent. Belgique, Vol. XII, p. 64, No. 64, 1869. "Taken on flowers—Los Angeles."

The type of this species is not included, but the description readily identifies it as the female of *Synanthedon bibionipennis,* of which it becomes a synonym.

Sesia nomadaepennis Boisduval.

Ann. Soc. Ent. Belgique, Vol. XII, p. 63, No. 63, 1869. "Found on flowers."

The type is a male of *Memythrus pyramidalis* (Walker), (Cat. Lep. Brit. Mus. Pt. VIII, p. 40, 1856), of which it becomes a synonym.

Sesia anthracipennis Boisduval.

Hist. Nat. Lep. Het., Vol. I, p. 392, 1875, " Georgia."

The female. This is a valid species which has remained unrecognized. Represented in the writer's collection by an unnamed series of specimens of both sexes in poor condition collected by Thos. Van Aller, of Mobile, Ala., during September. It will be treated and figured in a forthcoming publication.

Sesia asilipennis Boisduval.

(America boreal.)

Guérin-Méneville, Cuvier's, Règne Animal, Vol. II, 1829, p. 496, Pl. LXXXIX. Fig. 3 (Male).

A valid species, now listed as *Paranthrene asilipennis* (Boisd.) The male type lacks antennae and most of the legs, but is otherwise well preserved.

Sesia xiphiaepennis Boisduval.

(America boreal.)

This name is not listed in the literature which I have at hand. The type is a female of the peach borer, *Synanthedon exitiosa* (Say), under which it falls as a synonym.

Synanthedon texana (Hy Edw.)

Georgia, Fla.—Wittfeld.

Represented by two unnamed specimens, male and female.

Aserica castanea: A New Japanese Lawn Pest.—Mr. George P. Engelhardt in the October, 1927, BULLETIN OF THE BROOKLYN ENTOMOLOGICAL SOCIETY, Vol. XXII, p. 218, informs us of an invasion of the Japanese Beetle (*Popillia japonica*) on Long Island, N. Y. We now report upon another species of *Japanese* beetle, *Aserica castanea.* This beetle appeared in vast numbers during the summers of 1926 and 1927 in Woodlawn Cemetery and adjacent localities. The beetles seriously injured the English ivy on the graves and a few other kinds of plants, but did not seem to feed on any trees, shrubs or flowers. The beetle is nocturnal in habit and during the day lies buried about an inch or so beneath the surface of the ground. It is very active and runs almost like a carabid. In the larval stage it is a very serious pest to lawns, feeding upon the roots of the grass, causing it to turn brown and die. Some of our most valuable lots in the cemetery were destroyed and had to be reseeded. The beetle begins to appear about July 4 and is on the wing until about the middle of August. The damage to the lawns becomes noticeable during September and October.

WILLIAM BEUTENMULLER, Teaneck, N. J.

A DRAGON FLY OVIPOSITING ON A PAVED HIGHWAY.

By S. W. Bromley, New York, N. Y.

Any one who has driven a car in California—or, in fact, any other state where there are long stretches of shiny macadam roads and dragon flies in abundance—cannot have failed to notice the attraction which these roads have for dragon flies.

In the summer of 1925, the writer frequently observed great numbers of *Tramea, Pantala, Anax,* and Aeschnids, coursing over the shiny pavements of the inland route between Bakersfield and Lebec, California, and again in the Imperial Valley between Holtville and the sand dunes west of Yuma. These dragon flies were usually flying above the road at heights of from 15 to 40 feet, or even higher. Not many were observed to fly below 15 feet, although a few occasionally did so, but—as a rule—these were soon struck and blotted out by passing cars.

This reaction appears to be the positive reaction of these insects to water. At the period of their existence when—as Kennedy points out—the sex instinct is not over-balanced by hunger, these insects are attracted to water. Deceived by the resemblance of the road to a stream of water, they are consequently attracted to it.

Kennedy (Biol. Bull. Vol. XLVIII, No. 6, June, 1925) records the reaction of *Anax junius* to the crude oil pools at Bakersfield, California, where—deceived by the glistening surface of the oil—they perished by the hundreds in attempting to oviposit.

Actual attempts at oviposition in the roads were not observed by the writer in California, but this phenomenon was observed in the east a year later. On July 12, 1926, a female *Epicordulia princeps* was observed coursing over the shiny surface of an asphalt road just outside of Snow Hill, Maryland. The actions of the dragon fly were exactly as if oviposition were being attempted. The dragon fly flew over the road at a turn where the road was widest, keeping a course a few inches from the surface, and at intervals dipping the tip of the abdomen so that it touched the ground. These movements were observed for several minutes before the dragon fly finally flew away.

These phenomena further confirm the opinion that the reaction of the dragon flies to water is purely visional. To insects that depend largely on the sense of smell, the tarvia-strewn roadway would be decidedly repellent.

LITTLE KNOWN ANTHOMYID FLIES THAT COMMONLY OCCUR ON THE CATKINS OF WILLOW (MUSCIDAE, DIPTERA).

By H. C. Huckett, Riverhead, N. Y.

Recent collecting on Long Island has disclosed the presence of four small anthomyid flies feeding on the catkins of willow, *Salix discolor* Muhl. Two of these have already been recorded, namely, *Hylemyia* (*Egle*) *muscaria* Fabr. and *longipalpis* Mall., whilst two are herein described as new. In attempting the task of naming these specimens three additional species were encountered which belonged to the same group, namely *bicaudata* Mall., *fuscohalterata* Mall., and *parva* Rob.-Desv. The latter species was recorded by Stein(10)[1] as occurring in California. Through the kindness of Dr. Aldrich I have been able to examine Stein's specimens, and I doubt whether they are conspecific with the European specimen of *parva* sent to me by Herr Ringdahl.

Egle was first erected as a genus by Robineau-Desvoidy (6) in 1830 for the reception of twenty-one species. Little is known and little remains of the specimens described by Robineau-Desvoidy, with the result that the genus as he knew it is difficult to recognize. Coquillett (2) in 1910 designated *parva,* the twentieth species, as the type of the genus, and thereupon placed the genus in synonomy with *Pegomyia* Rob.-Desv. Schnabl and Dziedzicki (7) in 1911 retained the generic conception of *Egle,* in support of which they placed great faith in the delimiting characters of the male genitalia. Stein (9) in 1915 and Séguy (8) in 1923 placed *Egle* in subgeneric rank within the genus *Chortophila* Macquart. Malloch (5) in 1918 erected the genus *Xenophorbia* for the reception of *muscaria* on characters which in nearly all cases are equally applicable to the species *parva.* His use of the name *Egle* to denote the *radicum*-group is a misnomer and should be construed as *Paregle* Rob.-Desv. Johnson (4) listed *Egle* and *Chortophila* is subgenera of *Hylemyia* Rob.-Desv., a classification which perhaps best meets the situation as at present understood. For until the vast number of newly described species of *Hylemyia* have become more fully known the maintenance of many Desvoidian genera may well await a better occasion for recognition.

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[1] Reference to be found in literature cited on page 82.

In the meantime, as a working hypothesis, his names may be used effectively to designate minor groupings within the genus *Hylemyia sens. lat.*

All of the above species with the exception of one of the new forms readily conform to the characteristics of the subgenus *Egle* Rob.-Desv. They are characterized by the possession of the following adult characters: third antennal segment of short, squat proportions; antennae at base separated by a pronounced facial elevation; buccae and oral margin, in profile, protruded beneath the antennae; fore tarsi noticeably compressed laterally; female with the cephalic pair of paraorbital bristles proclinate, parafrontal bristles arranged in two separate series or rows; male with fifth sternum largely polished and glossy, and sparsely bristled; male copulatory appendages possess relatively large cerci (upper forceps) which become conspicuously attenuated distad, the gonostyli (lower forceps) are short, curved and stout (figs. 1-6.)

KEY TO SPECIES (MALES)

1. Thorax with 3 presutural and 4 postsutural dorsocentral bristles; scutellum with numerous accessory discal setulae; posterior notopleural bristle with a few setulae near its base .... *muscaria* Fab.
   Thorax with 2 presutural and 3 postsutural dorsocentral bristles; scutellum, at most, with one or two accessory discal setulae; posterior notopleural bristle with no setulae at base 2
2. Antennae at base inconspicuously separated; prealar bristle noticeably stout, spinelike; hind tibia with no anteroventral bristles; apex of antennae reaches a level with oral margin which is not protruded cephalad when viewed in profile; fore tarsi not compressed laterally......... **salicola** n. sp.
   Antennae at base conspicuously separated; prealar bristle normal, bristlelike; hind tibia with at least three or more anteroventral bristles; oral margin when viewed in profile slightly but distinctly protruded below apex of antennae; fore tarsi compressed laterally........................ 3
3. Hind femur with abnormally long bristles scattered throughout the anterior and posterior surfaces....*longipalpis* Mall.
   Hind femur with the normal definite series of bristles on anterior and posterior surfaces........................ 4

4. Fifth sternum with a group of longish erect bristles on each side and at base of processes; palpi spatulate; posterior surface of fore femora clothed with dense fine bristles. *bicaudata* Mall.

Fifth sternum with no long erect bristles on each side and at base of processes; palpi clavate; posterior surface of fore femora clothed with bristles of normal appearance......5

5. Buccae with a serial tuft of ten robust upcurving bristles invading the cheek; ventral margin of eye reaching to a level with oral vibrissae when viewed in profile; width of cheek at narrowest equal to breadth of third antennal segment. *parva* Rob.-Desv.

Buccae with no tuft of upcurving bristles invading the cheeks; ventral margin of eye reaching to a level below the oral vibrissae when viewed in profile; width of cheek at narrowest less than breadth of third antennal segment..........6

6. Mid femur with a duplicate series of posteroventral bristles on proximal two-thirds; each tergum with a broad black vitta which expands caudad and cephalad along the tergal margin ....*fuscohalterata* Mall.

Mid femur with a single series of posteroventral bristles on proximal two-thirds, and 2 or 3 additional basal bristles on posterior surface; each tergum with a broad subtriangular mark dilating cephalad along the tergal margin only. **tantalisa** n. sp.

FEMALES

1. Thorax with 3 presutural and 4 postsutural dorsocentral bristles; posterior notopleural bristle with basal setulae; scutellum with numerous accessory discal setulae. *muscaria* Fabr.

Thorax with 2 presutural and 3 postsutural dorsocentral bristles; posterior notopleural bristle with no basal setulae; scutellum with no accessory discal setulae..............2

2. Prealar short and noticeably stout, spinelike; not longer than half length of posterior notopleural bristle; proboscis very fleshy; palpi broadly spatulate; hind tibia with no anteroventral bristles............................**salicola** n. sp.

3. Hind femur with a sparsely set series of weak posteroventral bristles ....*fuscohalterata* Mall.

Hind femur with no bristles on proximal half of posteroventral surface......................................4
4. Hind tibia with a median posteroventral seta..*bicaudata* Mall.
Hind tibia with no setae on posteroventral surface........5
5. Apical dorsal bristle of hind tibia exceeds half length of hind basitarsus; thorax with 3 obscure yellowish brown vittae. *longipalpis* Mall.
Apical dorsal bristle of hind tibia not exceeding half length of hind basitarsus; thorax non-vittate........**tantalisa** n. sp.

Hylemyia (*Egle*) *muscaria* Fabricius

1775. ?Stomoxys muscaria Fabr. Ent. Syst., vol. 4, p. 395.
1838. Anthomyza brevicornis Zett. Ins. Lapp. p. 683, no. 99.
Records:—1 ♂ Ithaca, 20.4.95; 1 ♂ 28.4.15; 3 ♂ Oakwood, S. I., 22.4.20 (Colls. J. Bequaert and E. J. Burns): 4 ♂ 3 ♀ Baiting Hollow, Riverhead, L. I., 22.4.23; 3 ♀ 29.4.23; 3 ♀ 13.4.24; 6 ♂ 2 ♀ 8.4.25; 1 ♀ 24.4.26; 2 ♂ 20.4.27. 27 specimens, 17 males and 10 females.

This species is readily distinguished from others of the same group that commonly occur on willow catkins by its larger size and by the characters indicated in the key. Occasionally specimens possess only three instead of four postsutural dorsocentral bristles. The proboscis of the female is decidedly slender in contrast to the stout and fleshy proboscis of the remaining species.

Bezzi and Stein (1) in their catalogue of the palearctic diptera listed the species as *muscaria* (Meig. nec Fabr.). The doubt expressed was most probably owing to the apparent discrepancy in the original description which describes the antennae as plumose, "*antennis plumatis.*" This expression makes it questionable whether this is the same species referred to by Fabricius. The identity of the species may be more satisfactorily established by reference to Zetterstedt's description of *Anthomyza brevicornis.*

Séguy (8) makes the interesting note that the larvae of *muscaria* have been found in the catkins of willow.

Hylemyia (*Egle*) *parva* Robineau-Desvoidy

1830. Egle parva Rob.-Desv. Essai Myod. p. 590, no. 20.

Male. Blackish species; parafrontals, parafacials and cheeks silvery pruinescent. Antennae and palpi black.

Mesonotum and scutellum blackish, subshining; when viewed from above and behind with no distinct vitta: humeral and notopleural callosities light grayish, pollinose. Abdomen cinereous gray, when viewed from above and behind showing a broad black subtriangular mark on each tergum, fusing cephalad with the marginal fascia. Legs black, pulvilli tinged. Halteres brownish black. Calyptrae tinged, outer margin infuscated. Wings faintly and uniformly tinged, veins brownish.

Head with eyes separated at narrowest distance by about width of anterior ocellus; frontal vitta with two pairs of cruciate setulae, one weak pair immediately cephalad of anterior ocellus and a more distinctive pair caudad of caudal pair of parafrontal bristles. Parafrontals with five or six pairs of bristles. Parafacials at base of antennae about equal in breadth to width of third antennal segment, slightly receding and narrower ventrad: buccae prominent and protruded cephalad, oral margin slightly produced beneath antennae. Cheek ventrad of eye margin equal in breadth to width of third antennal segment, the anterior half invaded by an irregular series of long, robust upcurving bristles. Antennae separated at base by a broad rounded facial elevation, second antennal segment one and a half times as long as greatest width: third antennal segment slightly longer than broad. Arista minutely pubescent, thickened on proximal third. Palpi and proboscis long and slender, the distal portion of latter as long as fore tibia. Thorax with three pairs of longish presutural acrostical bristles. Dorsocentral bristles 2:3. Prealar bristle shorter than posterior notopleural bristle. Posthumeral bristles duplicated. Sternopleural bristles 1:2. Scutellum devoid of discal accessory setulae. Abdomen depressed, with margins subparallel, caudal segments gradually narrowed; terga subequal. Fifth sternum glossy, polished, with a ventrocentral tuft of hairs on caudal margin between the processes. Processes with a series of fine erect hairs encircling the inner margin. Fore tibia with posterior surface clothed with longish semierect setulae, bristles obscure, apical posteroventral bristle fine and pointed. Mid femur on proximal half with a series of anteroventral bristles, and an irregular double series of long posteroventral bristles. Mid tibia with one posterodorsal and one posteroventral bristle, apical bristles few and short. Hind femur with an entire series of anteroventral bristles and a series of fine shorter bristles on proximal two-thirds of posteroventral surface.

Hind tibia with 5 anteroventral, 4 anterodorsal, 3 posterodorsal bristles and a median series of semierect setulae on posteroventral surface. Tarsi compressed laterally; claws and pulvilli subequal. Wings pointed, with costal thorn minute: veins *R.* 4 + 5 and *M.* 1 + 2 subparallel: *m-cu* cross vein slightly sinuous. Length, 4 mm.

Record:—1 Hŏz (Sweden) 1.5.12 (Coll. O. Ringdahl).

This European species, so far as I know, has not been correctly recorded as appearing in North America. The above description is based on a single European specimen kindly furnished by Herr Oscar Ringdahl. The male specimens from California determined by Stein as *parva* differ noticeably from the European specimen in the appearance of the processes of the fifth sternum and in the bristling of the mid femur and cheeks. These specimens are slightly bleached and teneral, and thus do not lend themselves readily for positive identification. In *parva* the inner border of the processes possesses a marginal series of fine erect hairs, and at the midventral plane the inner margin has a distinctive tuft of hairs; the mid femur has an irregular double series of long bristles on the proximal half of posteroventral surface; the anterior half of cheek (buccae) is invaded by a series of robust upcurving bristles. In contrast, the processes of the fifth sternum in Stein's specimens possess an apical tuft of marginal hairs, and have no central tuft on the midventral plane; the mid femur has a single series of short weak bristles on proximal half of posteroventral surface; the cheeks are bare, the bristles being confined to the ventral margin in single series. The specimens from Staten Island and Long Island which were recorded by me (3) as *parva* are undoubtedly *longipalpis.* The male of the latter species may be readily distinguished from that of *parva* by the abnormally robust bristling of the anterior and posterior surfaces of hind femora.

Hylemyia (*Egle*) *bicaudata* Malloch.

1920. Hylemyia bicaudata Mall. Trans. Amer. Ent. Soc., vol. 46 no. 802, p. 193.

Record:—1 ♂ Ithaca, 26.4.14; 1 ♀ 20.4.20 (Coll. Shannon).

The male of this species may be readily distinguished from those of closely allied forms by the possession of long semierect bristles at the base of each process of the fifth sternum. There is a slight resemblance between *longipalpis* and *bicaudata* in this respect, but the bristles in the former case are much shorter and weaker. The halteres in the paratype from Virginia and in the specimen from Ithaca are blackish and not yellow as in the description. The species is recorded as having been captured on the catkins of *Salix tristis* Ait. I am indebted to Mr. J. R. Malloch for his helpful opinions concerning the identity of this species, and to Mr. E. T. Cresson for the loan of a paratype of *bicaudata.*

Hylemyia (*Egle*) *fuscohalterata* Malloch

1920. Hylemyia fuscohalterata Mall. Ohio Journ. Sci., vol. 20 no. 7, p. 279.

Record:—1 ♂ 1 ♀ Katmai, Alaska, June 1917. (Coll. J. S. Hine.)

Through the kindness of Prof. Hine I was able to examine the type and allotype of *fuscohalterata.* The male specimen differs slightly from the description in that the fore tibia has a distinct fine median and apical posteroventral bristle. The species most closely resembles *tantalisa.* In the male sex they may be distinguished by the character of the fifth sternum, the form of the abdominal vitta, and in the bristling of the mid femur: in the female sex the most significant difference is found in the bristling of the hind femur. These differences are dealt with in detail in the paragraphs devoted to *tantalisa.*

Hylemyia (Egle) tantalisa n. sp.

Male. Blackish species; parafrontals, parafacials, and cheeks silvery pruinescent with blackish reflections, face opaque, grayish; antennae and palpi blackish. Thorax, viewed from above and behind, with mesonotum and scutellum with blackish infuscation which tends to obliterate the dorsal markings; humeral areas light grayish, mesonotum with an obscure broad central vitta and lateral markings, sublaterals narrow and indistinct. Abdomen, viewed from above and behind, cinerous gray, opaque, each tergum with a broad, blackish subtriangular mark, expanding cephalad to fuse with the marginal fascia; fifth sternum largely polished and glossy. Legs blackish, pulvilli grayish. Wing membrane faintly and uniformly tinged, the basal area with blackish infuscation; veins chocolate brown. Calyptrae whitish, margins grayish tinged. Halteres blackish. Head with eyes separated by about the diameter of anterior ocellus; parafrontals narrowly separated below the ocellus by the frontal vitta. The latter with a minute pair of cruciate hairs below the anterior ocellus and a more distinctive pair caudad of the caudal pair of parafrontal bristles. Parafrontals with four or five pairs of weak bristles. Parafacials in profile at base of antennae scarcely equal in width to breadth of third antennal segment, narrowed at middle owing to the concavity of facial margin; cheeks with buccae moderately prominent, scarcely portruded beyond a level with face at base of antennae, width of cheeks ventrad of eye narrower than width of parafacial at base of antennae; marginal bristles fine, confined in single series along ventral margin, with two or three upturned bristles on buccal area; oral margin slightly protruded. Antennae at base separated by a rounded facial prominence; arista swollen at base, minutely pubescent. Palpi slender, with few fine bristles. Thorax with acrostical bristles irregularly paired, two or three presutural and postsutural pairs, the former slightly longer than the latter; dorsocentral bristles, 2:3. Posthumeral and prealar bristles duplicated, the latter shorter than posterior notopleural bristle. Sternopleural bristles 1:3. Abdomen depressed, conical, margins subparallel, caudal segments in profile thickened. Fifth sternum broadly and deeply incised on caudal margin, very sparsely bristled; processes with three short weak bristles and an apical tuft of fine setae on inner margin. On the membrane between the processes are paired chitinous areas bearing setulae (fig. 6). Fore tibia with a fine pointed apical bristle and two median posteroventral bristles which tend to become obscured owing to the erect position of the tibial setulae. Mid femur with a continuous series of short anterodorsal and anteroventral bristles which gradually become shorter apicad; posteroventral surface with longer erect bristles on the proximal two-thirds, in addition there is a short duplicating series of two or three basal bristles, the apical third of posteroventral surface bare. Mid tibia with one median posterodorsal bristle. Hind femur with a continuous series of anteroventral bristles which are much stronger on the distal half than on proximal half; posteroventral surface with a series of fine sparsely set short bristles on proximal two-thirds: hind tibia with 3 or 4 anteroventral, 4 to 6 unequal anterodorsal, and 3 or 4 posterodorsal bristles, posteroventral surface with a median series of semierect setulae. Tarsi about equal in length to their respective tibia, claws and pulvilli equal in size on fore, mid, and hind legs. Wing with costal thorn small but distinct; veins *R.* 4 + 5 and *M.* 1 + 2 slightly divergent toward wing margin; *m-cu* cross vein slightly sinuate. Length, 3.5 mm.

Female similar to male, differing essentially in the following characters:—head with parafrontals, parafacials and cheeks grayish pruinescent. Frontal vitta reddish. Thorax and abdomen opaque, grayish, unmarked. Mesonotum slightly brownish infuscated. Halteres reddish yellow. Wings clear throughout.

Head with each parafrontal and frontal vitta nearly equal in width. Cruciate bristles present. Fore tibia with no median anterodorsal bristle, with a median posterior bristle; mid femur with two or three short bristles on basal half of posteroventral surface; mid tibia with one anterodorsal, two posterodorsal and two posteroventral short bristles; hind femur with only three or four strong bristles on apical half of anteroventral surface, posteroventral surface bare: hind tibia with two or three anteroventral, three or four anterodorsal and three posterodorsal bristles.

Records:—2 ♂ 2 ♀ Baiting Hollow, Riverhead, L. I., 24.4.26; 3 ♂ 1 ♀ 2.5.26; 1 ♀ 4.5.26; 6 ♂ 15.4.27; 1 ♀ 22.4.27; 1♀ 1.5.27. 17 specimens, 11 males, 6 females.

Type and allotype in U. S. National Museum.

This species agrees very closely with *fuscohalterata.* In my opinion it differs however in the following particulars. In the male the fifth sternum possesses a different arrangement of bristles as shown in figure 6. The form of the abdominal vitta also differs in that in *tantalisa* each tergum possesses a broad subtriangular mark, whereas in *fuscohalterata* each tergum possesses a broad dorsocentral vitta which dilates caudad and cephalad along the tergal margins. The bristling of the mid femur also shows a rather noticeable variation in that in *tantalisa* the posteroventral surface possesses a single series of posteroventral bristles and in addition two or three basal bristles on posterior surface, whereas in *fuscohalterata* the accompanying or duplicating series of bristles extend for the full length of the posteroventral series. In the female the most significant differences appear in the bristling of the hind femur. In *tantalisa* the proximal half of posteroventral surface is bare, whereas in *fuscohalterata* there is a series of four or five fine sparsely set bristles.

Hylemyia (*Egle*) *longipalpis* Malloch

1924. Hylemyia longipalpis Mall. Psyche, vol. 21, no. 5, p. 197.

Records:—1 ♂ Ithaca, May: 1 ♂ Oakwood, S. I., 22.4.20 (E. J. Burns): 6 ♂ 23 ♀ Baiting Hollow, Riverhead, L. I., 22.4.23; 1 ♂ 12 ♀ 27.4.23; 5 ♂ 3 ♀ 29.4.23; 1 ♂ 13.4.24; 10 ♂ 2 ♀ 8.4.25; 1 ♂ 2 ♀ 2.4.26; 5 ♂ 7 ♀ 24.4.26; 3 ♀ 4.5.26; 1 ♂ 15.4.27; 1 ♂ 3 ♀ 20.4.27; 13 ♂ 10 ♀ 22.4.27; 4 ♂ 4 ♀ 1.5.27. 119 specimens, 50 males, 69 females.

The male of this species may be readily distinguished from those of its closest relatives by the strikingly more numerous and robust bristles on the hind femur. The female is not to be so readily distinguished as in the case of the male. Specimens average a larger size than any of the species mentioned except *muscaria.* Frequently specimens possess three well defined vittae on the mesonotum of a tawny color; this character will vary all the way to nearly complete obscurity. The species was formerly recorded by me as *parva.*

Hylemyia (Chortophila) salicola n. sp.

Male. Blackish species, parafrontals, parafacials and cheeks with faint whitish pruinescence: antennae and palpi blackish. Thorax subshining, viewed from above and behind, the mesonotum has a broad black median vitta and narrow sublaterals; scutellum blackish; humeral regions lighter colored. Abdomen subshining, cinereous gray, with dark obscure fasciae and no definite dorsal markings on terga. Legs blackish. Wings smoky, more densely tinged basad. Veins dark chocolate brown; halters blackish; calyptrae white.

Head with eyes separated at narrowest by a distance slightly greater than anterior ocellus. Parafrontals narrowly separated cephalad of anterior ocellus, the frontal vitta gradually expanded toward base of antennae. Parafrontals with three or four pairs of weak bristles, cruciate setulae distinct. Head in profile with eyes large, parafrontals and parafacials scarcely equal in width to one half breadth of third antennal segment. Cheeks ventrad of eye equal in width to breadth of parafacials at base of antennae. Vibrissal angle not protruded cephalad beyong the level of head at base of antennae. Antennae separated at base by a slight facial ridge. Third antennal segment but little longer than second, about as long as its greatest breadth, apex reaching to level with oral margin. Arista noticeably swollen at base. Palpi spatulate apicad; proboscis slender. Thorax with few accessory setulae on mesonotum, scutellum devoid of acessory setulae. Mesonotum with three pairs of presutural acrostical bristles, the postsutural acrosticals not so regularly paired and much weaker than those of presutural bristles. Posthumeral bristles duplicated. Prealar bristle short and stout, about equal to half length of posterior notopleural bristle. Sternopleural bristles, 1 : 2. Abdomen depressed, margins subparallel, with marginal bristles poorly defined except on fifth segment. Tergal setae noticeably longer and stronger laterad than on the dorsum; caudal segments slightly thickened when viewed laterad. Fifth sternum polished, glossy, processes beset with a series of five or six hairs (fig. 3). Legs with weak bristles, especially the apical tibial bristles. Fore tibia with a median posterior bristle, apical posteroventral bristle weak, scarcely distinguishable from the setulae. Mid femur with an entire series of weak anteroventral bristles and a duplicate series of five or six bristles on the proximal two-thirds of posteroventral surface: mid tibia with one or two posterodorsal bristles. Hind femur with an entire series of anteroventral bristles which become considerably weaker proximad, posteroventral surface with a series of sparsely set weak bristles on proximal two-thirds. Hind tibia with a median series of rather pronounced setulae on anteroventral surface, bristles absent; with two or three distinctive anterodorsal, and two weak posterodorsal bristles, occasionally a third. Tarsi with segments two, three and four, short and beadlike. Pulvilli and claws small. Wings with veins *R.* 4 + 5 and *M.* 1 + 2 slightly divergent to margin; *m-cu* cross vein straight. Costal thorn minute. Length, 2.25 to 2.5 mm.

Female as male, differing essentially as follows: Lighter in color, cinereous gray. Abdomen with no distinctive vitta or marks. Halteres tinged with reddish. Head, viewed from above, with frontal vitta reddish, at least anteriorly, but little wider on the average than each parafrontal. Cruciate bristles present, minute. Palpi more distinctively spatulate. Proboscis stout and fleshy. Abdomen sparsely and weakly bristled. Fore tibia with posterior bristle situated basad of middle: mid tibia with or without anterodorsal bristle: hind femur with two or three strong bristles on apical third of anterodorsal surface, and one or two weak basal posteroventral bristles: hind tibia with two or three posterodorsal bristles.

Records:—1 ♂ 2 ♀ Baiting Hollow, Riverhead, L. I., 8.4.25; 1 ♂ 8.5.25; 7 ♀ 2.5.26; 1 ♀ 4.5.26; 18 ♂ 2 ♀ 24.4.26; 25 ♂ 1 ♀ 15.4.27; 4 ♂ 16 ♀ 22.4.27. 78 specimens, 49 males, 29 females.

Type and allotype in U. S. National Museum.

This species is closely allied to those of the subgenus *Egle*, having the characteristic squat proportions to the third antennal segment; the fifth sternum in male is polished and sparsely bristled. It however does not possess the characteristic protruded buccal area and oral margin, nor the laterally compressed segments of the fore tarsi as in *parva*. The species may be readily separated from its closest allies by the lack of bristles on the anteroventral surface of hind tibia; the antennae are not separated at base by a prominent facial elevation; and by the characteristic abnormally stout prealar bristle.

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EXPLANATION OF PLATE II

Fig. 1. Dorsal (or caudal) aspect of male copulatory appendages of (*Chortophila*) *salicola.*
Fig. 2. Lateral aspect of male copulatory appendages of (*Chortophila*) *salicola.*
Fig. 3. Ventral aspect of sternum 5 of (*Chortophila*) *salicola.*
Fig. 4. Dorsal (or caudal) aspect of male copulatory appendages of (*Egle*) *tantalisa.*
Fig. 6. Ventral aspect of sternum 5 of (*Egle*) *tantalisa.*

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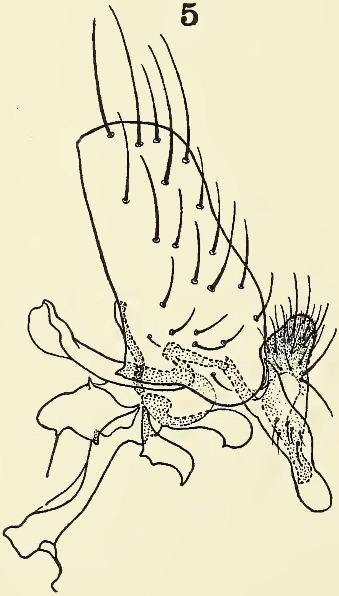

Fig. 5. Lateral aspect of male copulatory appendages of (*Egle*) *tantalisa.*

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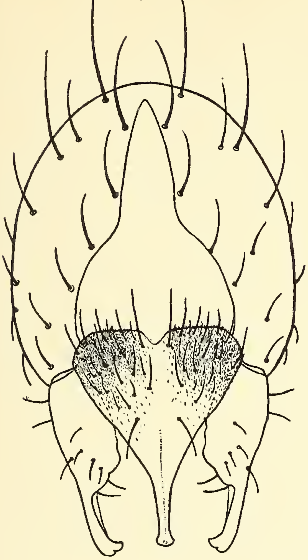

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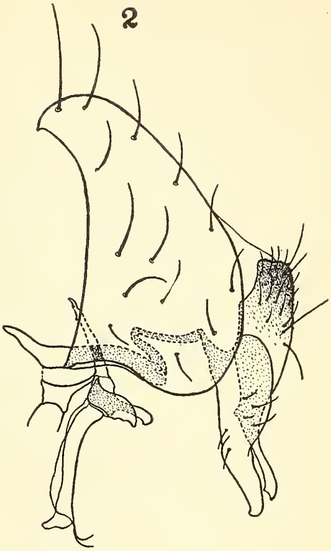

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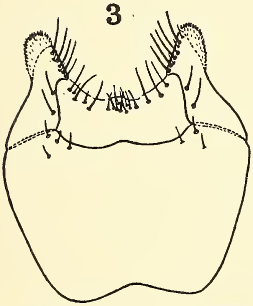

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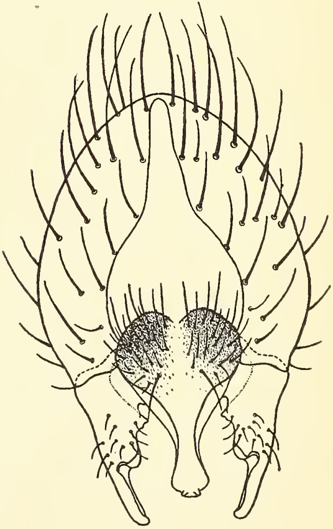

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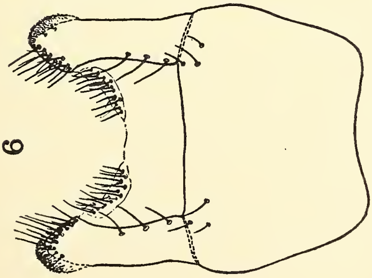

COLLECTED BY THE SOUNDING WATERS

By C. A. Frost, Framingham, Mass.

On July 29, 1927, about 1 P. M., curious natives may have observed a lone stranger kneeling amid the cobblestones and coarse gravel on the rim of the swiftly flowing Portaupique River in Colchester County, Nova Scotia, and wondered if they were not gazing on an ancient rite of devotion to some mystic River God of the clear, rushing stream.

His figure is clad in corduroy trousers tucked into heavy and high hunting shoes, a white cotton shirt with rolled-up sleeves exposing sun-scorched arms plentifully decorated with brier scratches; he is bare-headed, with perspiration streaming down across his face ; near him lies a cap and in it are heavy-rimmed spectacles, while nearer to his hand is a cloth net and further off a corduroy bag with a shoulder cord. A queer devotee, kneeling on the hot rounded pebbles, supported by the right hand and pawing stones and gravel towards him with the gloved left. Now he hurls a large stone behind him, then he pulls up an evening primrose stalk or bunch of sedge and, after shaking it over the smoothed space amid the larger pebbles, throws it aside; all the while his eyes are steadily fixed on the ground before him. At intervals he suddenly stoops lower and wetting his fore finger in his mouth claps it down quickly onto the ground and as he raises it places his thumb over the finger ; at the same time he picks up a small vial with his left hand, removes the cork with his teeth and holds it ready while he carefully releases the pressure of his thumb until a minute insect is seen adhering to the finger or partly held by the thumb ; often this speck vanishes instantly, magically in fact, before the finger can be placed over the mouth of the vial, and, with a muttered orison, the careful scrutiny of the ground is resumed.

Now he rises to his feet, wipes the perspiration from his face, and stumbles down the rocky shore to the river a few feet away; he throws himself down full length and plunges his head to the ears into the cold, limped water ; then he returns to the selected spot and resumes his former occupation.

One hour, two hours, three hours pass on; the westering sun looks down more kindly; a cooling breeze comes fitfully down the river; the larger stones cast their shadows across the ever-widening area before him; he holds the vial to the light, rises to his feet, groans and rubs his knees; then picking up his belongings he splashes through a small branch of the river and disappears among the alders and willows that fringe a dry overflow bed of the river.

Such was my penance for losing a bottle containing a whole day's catch while beguiled by the luscious blueberries along my path to camp. At the risk of house-maid's-knee and even fatal sunstroke here on this pebbly bar I had painfully accumulated many *Hynoidus melsheimeri* Horn, *pectoralis* Say, *obliquatulus* Melsh. and *Cryptohypnus lecontei* Leng, while previous sweeping had resulted in numerous other interesting things, such as *Galerucella perplexa* Fall from *Salix, Anthonomus molochinus* Dietz from an unknown plant, many *Bembidions* washed from their hiding places among the pebbles by water dashed up onto the shore with a curved piece of bark, and many other specimens of lesser interest; and all were now reposing peacefully somewhere amid the blueberry bushes of the pasture.

Each evening for three days I had devoted an hour to searching for that vial, racking my brains to recall my exact trail through that uncertain hundred feet of pasture, striving for some "hunch" that would unravel the crooked path of blueberry lure, divining whether I had stopped seldom or often before I discovered my loss,—and all had failed.

And so it comes that the lengthening shadows of this later day mark the completion of the vow to replace as many of the lost specimens as possible. With the satisfaction of a task well done I sought the hidden pool amid the alders for a refreshing swim untroubled by thoughts of prying bathing-suit censors and gaping tin-can tourists.

As I passed through the shaded opening amid the bushes I stopped to pick several fine raspberries from an isolated bush in my path. I noticed a large one had previously fallen and frugally stooped to "save" it. Mechanically I looked inside it and saw it was filled with small black specks; then, as I lightly pressed it, one of those specks suddenly vanished in so familiar a manner that it dawned on me that I was looking at eight or more *H. melsheimeri* feeding on the berry. Hastily dumping berry and its inhabitants into the vial, I examined the ground beneath the bush. Many more of these little insects were crawling about or resting after their labors of the day in the hot sun. In three minutes I captured more specimens than I had acquired so painfully and uncomfortably in the three hours spent on the river beach; but this is only one way of unveiling the secrets of nature.

On the fourth day after the loss as I turned up an old fence slab and beheld a fine *Pityobius anguina* Lec., I murmured, "My lucky day. I will find my vial to-day." Shortly before sunset I stood once more on the spot where I had parked my coat on the day of misfortune, faced towards camp and moved slowly forward with my mind firmly focused on blueberries; subconsciously I turned aside at right angles after walking a few yards and then continued a few steps and stooped to pick a few large berries—Lo, behold! There, directly under my fingers, was the upright missing vial.

Scoff not, O Unbelievers! There *are* Guardian Angels!

Notes on New England Lepidoptera

In New England *Enodia portlandia* Fabr. is not common. A battered specimen was taken on the banks of the Crooked River near Naples, Maine, August 13, 1926. It was flying in the shade of a heavy growth of swamp alder. Specimens of *tarquinius* were dashing about in profusion enough to satisfy the appetite of any aggressive collector.

Oeneis semidea Say was holding its own on the peak of Mt. Washington during 1927. At Dr. Scudder's Semidea Plateau August 1st several specimens were observed flitting about the mossy boulders and sedge grass whenever the sun had a chance to appear.

It might be worthy of note that the swamp alders on the banks of the Peabody River north of the Glen House no longer are a haunt of *Feniseca tarquinius* Fabr. The plant lice apparently have disappeared entirely.

Wm. Prescott Rogers, Fall River, Mass.

THE FIRST KNOWN EMBIOPHILE, AND A NEW CUBAN EMBIID

By J. G. Myers, Imperial Bureau of Entomology, London.

(With one figure.)

One of the most remarkable features of all the better known insect societies is the presence of a varied assemblage of inquilines—known respectively as myrmecophiles, melittophiles, sphecophiles and termitophiles—entering into the most diverse relations with their hosts. So far as I know, the colonies, often very populous, of Embiids, have not hitherto yielded any guests. The present notes deal with a peculiar beetle which lives in Embiid nests in Cuba, and with the habits of its host, which I have been unfortunately compelled to describe as a new species. The observations were made while I enjoyed the privilege of an Atkins Harvard Fellowship at Soledad, Cuba.

In February a huge colony of *Oligotoma hospes* Myers (described below) was found at Soledad covering the trunk and larger branches of a large physic-bean tree (*Cassia fistula*). So far as could be seen it formed one continuous nest. At least the silk constituted a continuous mat, which could be peeled off in strips several feet long and of considerable thickness, with several superposed layers each containing numerous passages or tunnels. Friederichs considers the web is a protection against ants. In the present case ants were observed running in some numbers over the smooth outer surface, and it is probable they could not penetrate it.

In the thickest and most populous parts of the web several small black beetles were found. Some of these and of the Embiids were enclosed in a large glass vessel with a mass of their webbing and some bark, and were kept thus for a week. Unfortunately the large mass of material made it impossible to observe the insects; so this nest was broken up, the beetles running with great facility in the tunnels during the process. These and some of the Embiids were then placed in a large glass tube with two strips of fresh bark from the nest tree. The Embiids began at once to spin, in daylight, with an appreciable result in five minutes, and soon the pieces of bark were bound together and the spinners hidden between them. The next day the beetles were clustered at several places on the outside of the nest—apparently never having entered it. On the third day the nest had become very compact, and the owners were rarely seen outside it. The beetles wandered actively over the nest, clinging to the webbing or to the exposed bark. A free Embiid from the original colony was dropped into the tube. It climbed about actively for nearly a day, but apparently could not gain entrance to the nest. At the end of the day it was dead, at the bottom of the tube.

The tube was kept in a vertical position. On the seventh day, for the first time, connecting webs were spun—a kind of scaffolding—across to the cork and the sides of the tube. The beetles then went up to the cork and rested on the new webbing there. They had not previously clustered in that position, though well able to climb up a glass surface.

It is apparent that the beetles enter into no very close relations with the Embiids, and that they are only facultative embiophiles is suggested by the discovery of one example under the bark of a guasima tree (*Guazuma tomentosa*) distant from a colony.

These beetles have been kindly determined by Mr. G. J. Arrow, of the British Museum, as *Hyporrhagus marginatus* (Fabr.), a Monommid (Monomatid, Tillyard) originally described from Cuba, but of which the British Museum has only examples from Santo Domingo.

It is a small black beetle 3.9 mm. long, with a greatest width of 2.1 mm. The whole form is very compact, the upper surface forming a continuous curve over pronotum and elytra. The surface is pitted but shining and very hard. The edges of the elytra are folded over laterally so as to clasp the sides of the abdomen. The antennae fold back under the lateral margins of the pronotum. The head itself in repose is retracted beneath the pronotum 'till it is barely visible in dorsal view. The legs all fold up in a truly remarkable way. The stout femora fit closely into individual grooves on the undersurface of the body, the tibiae folding under a knife-like ridge of their femora, and the tarsi folding back again beneath a similar tibial ridge, so that the claws just reach the sides of the body. Thus the legs, closely folded, lie flush with the rest of the strongly-armoured, evenly-rounded ventral surface of the body. The insect thus contracted may be turned this way and that without one finding the least salient point. It slips between the fingers like a wet apple pip.

When disturbed the beetles will occasionally "feign death" in the approved manner, the appendages being then closely folded as described. We are, however, perhaps not justified, with our present knowledge, in considering this behaviour, with the structures which make it possible, as especially correlated with the embiophilous habit, since both recur to a considerable extent in non-inquiline Byrrhidae.

The family Monommidae is a very small but widely distributed one, concerning the biology of which practically nothing is known. Dr. G. A. K. Marshall has been so good as to give me the following notes regarding it.

"Fletcher has bred numerous larvae (of a *Monomma*) from a rotting papaw stem. Champion collected all his Central American *Hyporrhagus* by beating herbage and dry twigs, except one species, which he took under fallen *Opuntia* leaves. Finally a North American species has been found in rotting *Opuntia* leaves."

Oligotoma hospes, sp. nov.

Male, structure: Eyes not projecting much outside outline of head, their hind margins sinuate. Length behind eyes considerably greater than width between eyes, but about equal to width at antennae. Head strongly but gradually narrowed behind eyes. Pronotum considerably broadened posteriorly, its lateral margins slightly sinuate. Wings with the following cross-veins additional to those usual in *Oligotoma*—in forewings, one connecting radial sector with its fork, and one from this work to the media; in hindwings one or two from radial sector to its fork and one from that to media. Male genitalia as figured—first segment of left cercus considerably swollen, with its inner projection coarsely echinulate; right cercus normal.

Length: Excluding cerci, 8.75 mm., forewing, 8 mm.

Color: Dark brown, both wings with four pale lines.

Female: Paler in color and attaining a length of 25 mm.

Described from numerous examples of nearly all stages, Soledad, Santa Clara, Cuba, no. 523, J. G. Myers, 10, 11. 1925.

Holotype male in Museum of Comparative Zoology, Cambridge, Mass. (2 slides and 1 vial of alcohol). Numerous material of nearly all stages in the collections of M. C. Z. British Museum and the writer.

I leave to a specialist the task of describing in detail the female and the earlier instars.

This insect differs from all other *Oligotoma* species apparently, in the form of the first segment of the left cercus in the male, and in venation from all except the Cuban *O. venosa* Banks, which is a much smaller species with a simple left cercus. *O. hardyi* Friederichs, from Western Australia, has also unusually numerous cross-veins, a condition which Tillyard believes "to be correlated with the somewhat larger size and stronger build of this insect." That such a supposition is probably erroneous is indicated by the very small size (wing only 4 mm. long) of *Oligotoma venosa.*

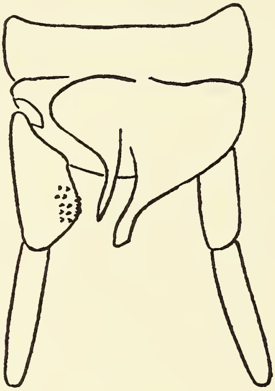

FIGURE I.

Oligotoma hospes, sp. nov., KOH preparation of tip of male abdomen, dorsal view. Chaetotaxy omitted, but consisting of long hairs.

AN OBSERVATION ON THE ESTIVATION HABIT OF THE BOMBYCID LARVAE OF ARACHNIS PICTA PACK.

By Geo. P. Engelhardt, Brooklyn Museum.

On June 25, while investigating the breeding habits of *Synanthedon resplendens,* a clear-wing moth which is a common borer below the bark on sycamores in the Arroyo Seco at Pasadena, Calif., three stiff-haired larvae were discovered huddled among spider webs in a hollow on an old tree trunk. They suggested the larvae of *Ecpantheria deflorata,* but lacked the orange, segmental bands characteristic of that species. Assuming that they had assembled for the purpose of pupating, they were placed in a small tin tobacco box and mailed east with other collections.

Returned to Brooklyn in late July, the larvae, still in their narrow travelling compartment, were found in good condition and unchanged. Transferred to a more spacious breeding box they crawled about actively, but refused all food, such as plantain, dandelion, grass and weeds. On September 10th one of the larvae was found within a very flimsy web attached to the cover of the breeding box. Two days later it had changed to a black, blunt pupa with a transparent, sticky substance adhering to it like dew. The larval skin had been shed entire, none of the bristly hairs being used in the construction of a cocoon. Another one of the larvae was then inflated, it being noted that the intestinal tract was free from food substances whatsoever. The third larva, at the time of writing, September 28th, still remains unchanged in the breeding box without feeding. A beautiful female of *Arachnis picta* emerged from the pupa on September 24.

Harrison G. Dyar reports on the breeding of two species of *Arachnis,* Can. Ent., Vol. XXVI, p. 307. For *A. aulea* he records nine larval stages followed by hibernation and pupation in June within a transparent double cocoon mixed with a few hairs. For *A. suffusa* he records six larval stages, hibernation within a slight cocoon and pupation in the spring. His breeding material came from Mexico, obtained through Mr. Jacob Doll.

Anyone acquainted with the arid regions of the West cannot fail but observe the apparent scarcity of insect and other life during the dry summer. Yet living animals are present in comparatively large numbers. Endowed to survive such periods of drought, they remain dormant in one or another stage of their development to become active again with the advent of the rainy season.

CONCERNING THE SPELLING OF "YPSILON."

By Roger C. Smith, Kansas State Agricultural College, Manhattan, Kans.

When Fitch described *Chrysopa ypsilon,* he spelled the species name "ypsilon." The writer, in his memoir on "The Biology of the Chrysopidae," p. 1352, changed the spelling in the discussion of this species word to "upsilon," since that is the correct spelling of the Greek letter "U." The word "ypsilon" has been used a half dozen times or more as the species name for insects and generally the spelling is "ypsilon." The question arises as to whether or not this spelling should be changed to the usual spelling of the Greek word "upsilon."

The writer referred the question to a Greek scholar, Dr. O. Perry Hoover, Professor of Greek and Latin at Juniata College, Huntingdon, Pa., and the following are excerpts from his letter:

"The spelling 'ypsilon' in entomology is correct, but the Greek letter is spelled 'upsilon.' The vowel is today (1) a calligraphic variation of *i* or *ie* (citie, city); (2) it is used in English words of Greek origin which contained *'upsilon.'*

"The letter *'upsilon'* is found in two forms in ancient Greek inscriptions, V, Y. The Romans adopted the first form (V), which was gradually rounded into U, whence our English U. At the time Latin began to borrow words from the Greek, the second form (Y) had become common. Since Latin had no Y, this form was retained in the transcribed Greek words and was added as a new letter to the Latin alphabet, whence it passed on to the Anglo-Saxon and became English Y. This second form (Y) is generally used for the Greek *"upsilon"* in modern English, *e.g.,* Cyrus, hyper, hypo, Ypsilanti, ypsilon, etc."

The writer was, therefore, in error in changing the spelling of the species name of *Chrysopa ypsilon* to "upsilon." Apparently, wherever this word is so used, the spelling "ypsilon" is correct.

NOTES ON SOME WEST INDIAN CHRYSOMELIDAE.

By Doris H. Blake, Bureau of Entomology, Washington, D. C.

The following notes and descriptions of new species of Chrysomelidae were made in the work of identifying and arranging material in the U. S. National Museum. The new species were found in material sent by W. A. Hoffman.

Lamprosoma floridanum (Horn).

Lamprosoma floridanum (Horn), hitherto recorded only from Florida, is represented in the National Museum by specimens collected by W. M. Mann in 1918 at Bluff and Spanish Wells, Bahamas. This species, originally described in *Oomorphus,* is intermediate between *Oomorphus* and *Lamprosoma.* It possesses the tiny eighth antennal segment so striking in *Oomorphus,* but instead of the simple claws characteristic of that genus it has the appendiculate claws found in *Lamprosoma.* The genus *Oomorphus* of late has been merged into *Lamprosoma,*[1] possibly because of this fact. Either a third genus must be erected for such intermediate species, keeping up the genus *Oomorphus* Curtis (1831) for such as *Oomorphus concolor* (Sturm), the genotype and sole representative in Europe, and *Lamprosoma* Kirby (1818; genotype *L. bicolor* from Brazil), for those having a large eighth antennal segment, or all the species be merged into one genus. The latter course for the present may be preferable.

Leucocera hoffmani n. sp. (Fig. 1.)

Large (7.8 mm.), convex, rounded, not shining, dull alutaceous, deep reddish brown, each elytron with two basal aeneous green blotches, and in well marked specimens two broad irregular fasciae, one median, the second before apex, suture frequently aeneous its entire length, and the coarse, sparsely and irregularly spaced series of punctures on elytra aeneous spotted. Antennae extending to humeral prominences, pale yellow with darker tip to apical segment. Head broad, deep reddish, lightly punctate with coarser punctures about eyes; eyes small, elongate, a deep narrow groove from inner margin of eyes extending downwards towards clypeus,

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[1] Jacoby, Fauna of British India, 1908, p. 281. Junk, Coleopterorum Catalogus, pt. 53, p. 224. Leng, Catalogue of Coleoptera of America North of Mexico, 1920, p. 292.

> also a faint median vertical line just anterior to clypeus joining with two other lines running at oblique angles and forming a triangle above clypeus. Prothorax about three times as broad as long, convex, anterior margin curving forwards and forming with lateral margin an acute angular projection beside eyes; surface smooth, dull with scattered light punctures except on sides, there with numerous deep, coarse punctures extending about basal margin and becoming sparser and interrupted altogether at middle; color deep reddish brown. Scutellum deep brown, often with aeneous luster. Elytra rounded, convex, nearly as broad as long, deep reddish brown with aeneous green basal blotches, one in middle of base of each elytron, the other over humerus, and frequently irregular fasciae, one median, possibly consisting of confluent spots, wider at suture and middle of each elytron, and another fascia before apex, also wider at suture and middle of elytron, both fasciae extending to lateral margin; suture also frequently green; in one of three specimens no trace of these fasciae, the only markings consisting of the basal blotches and the green spots marking the punctures; surface smooth, alutaceous, with sparse, shallow, coarse punctures, arranged serially and irregularly spaced, and with faint tracing of line between punctures; between these rows of coarse punctures and only visible under magnification a row of widely but regularly spaced very light punctures. Body beneath shining, deep reddish brown, sometimes with aeneous luster. Length 7.4–7.8 mm.; width 5.2–5.5 mm.

Type and two *paratypes.*—Cat. No. 40975 U. S. N. M.

Type locality.—Hinche, Haiti. Collected by W. A. Hoffman, May 1925.

Leucocera hoffmani is one of the larger species of this rather small West Indian genus, being nearly as large as the genotype, *L. quinquepunctata* L., which is entirely green except for five small, well-defined red spots on each elytron. Several other species have similar green and ferruginous coloring, but none of these appears to be so closely allied as to be easily confused. *L. sexguttata* Chev. has the head and elytra green or blue, the elytra with spots or fasciae, and the thorax violet purple; *L. optica* Suffr. is aeneous green with two red spots and a fascia on posterior part of elytra and the body beneath is blue green; *L. aeneomicans* Stål is described as ferruginous with entirely aeneous elytra, and is apparently a smaller species.

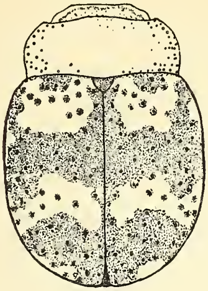

Fig. 1.

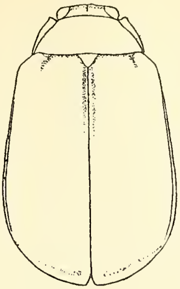

Fig. 2.

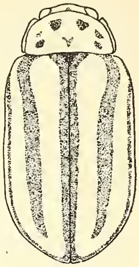

Fig. 3.

Fig. 1.—*Leucocera hoffmani,* n. sp.
Fig. 2.—*Oedionychis lantanae,* n. sp.
Fig. 3.—*Disonycha spilotrochela,* n. sp.

Oedionychis lantanae n. sp. (Fig. 2).

Rounded oval (6 mm.), not twice as long as wide, slightly convex, shining, very indistinctly punctate, entirely pale ferruginous. Antennae slender, not half as long as body, pale and nearly unicolorous in female, darker in male with segments 6, 7, 8 and 9 pale yellow; third segment equal to fourth. Head shining, rounded, with a few sparse, indistinct punctures; frontal tubercles not produced; interocular space about half width of head. Prothorax over twice as wide as long, convex with explanate lateral margin narrow at base and widening apically and forming a thickened tooth; very indistinctly and sparsely punctate. Scutellum triangular, but somewhat rounded at apical angle, margin deeper brown. Elytra convex, rounded, considerably wider below middle, with narrow explanate margin and rounded humeral prominences, distinctly sulcate within humeri; polished, very sparsely and faintly punctate; pale ferruginous with slightly darkened margin and sutural edge, and in one specimen a faint violet luster about scutellar region. Body beneath with sparse, pale pubescence, shining, entirely pale ferruginous. Length 5.8–6 mm.; width 3.5–3.8 mm.

Type, male, and two *paratypes* (one male and one female.)—Cat. No. 40976 U. S. N. M.

Type locality.—Mariani, Haiti. Other localities.—La Vanneau, Haiti.

Collected October, 1924, by W. A. Hoffman.

Food plant.—Lantana camara L.

Possibly there is a variety of this species in which the pronotum is spotted, as in one specimen very obscure darker markings on the pronotum suggest this variation. This species is quite distinct from the other yellow brown species of the genus by being entirely unicolorous without darker legs or antennae, and very polished and rounded convex in shape. *Oedionychis tibialis* Jac. is smaller, less rounded and more depressed. *Oedionychis montana* Jac. is also smaller and has dark antennae and anterior tibiae and tarsi. *Oedionychis apicornis* Jac. from Bolivia and *Oedionychis flavida* Horn from Texas are elongate and have parallel sides.

Disonycha spilotrachela n. sp. (Fig. 3).

Shining, nearly impunctate, elongate oval, small (5 mm.), yellow brown, head with piceous spot on occiput, pronotum 5–7-spotted, elytra with black common sutural vitta uniting with narrow submarginal one, a discoidal median vitta on either elytron, not reaching apex. Antennae about half as long as body, piceous with reddish brown basal segments, third segment shorter than fourth. Head shining, smooth on occiput, a circle of coarse punctures on either side of front near eyes, interocular space about half width of head; pale reddish brown with small piceous occipital spot. Prothorax not twice as wide as long, narrowed anteriorly, convex; very shiny with only slight trace of transverse basal depression, impunctate, yellow brown with 5 or sometimes 7 piceous spots, consisting of two larger and closer set anterior spots and three basal ones, with sometimes two other fainter lateral spots. Scutellum piceous, shining, triangular. Elytra nearly three-fourths as wide as long, oblong oval, with sides subparallel; surface shining, smooth with light sparse punctures only visible under high magnification; yellow brown with common black sutural vitta uniting at apex with narrow submarginal vitta, and on each elytron a median vitta, not quite as wide as yellow spaces on either side, and not reaching apex. Body beneath covered with dense, pale pubescence, pale with darker outer edge to epipleura and dark streak on tibiae; tarsi dark brown or piceous. Length 5–5.3 mm.; width 2.7–2.9 mm.

Type locality.—Mon Fleri, Haiti. Other localities.—Lake Tortuguera, Porto Rico.

Collected by W. A. Hoffman in Haiti and by S. T. Danforth in Porto Rico.

Type, male, and one *paratype* (male).—Cat. No. 40977, U. S. N. M.

This species resembles in markings the common North American *Disonycha 5-vittata* Say, but is much smaller and more shining, the head polished and with few punctures, the elytral vittae wider and the depression at base of pronotum not as marked as in *D. 5-vittata. Disonycha spilotrachela* is about the size of *D. caroliniana* Fab., but in the latter the sides are rounded and the thorax usually 2-spotted. The only *Disonycha* that could be confused with it is *D. gowdeyi* Bryant from *Jamaica.* The head in *gowdeyi* is impunctate, with three dark spots and with piceous labrum, the antennae have the third segment a little longer than fourth, the sides of the prothorax are nearly parallel, and the arrangement of the spots on the pronotum in rows is quite unlike the semicircular arrangement in *D. spilotrachela.* The size of *gowdeyi* is 6–7 mm., while *spilotrachela* is 5–5.3 mm.

ALTICA LITURATA Olivier (*Megistops walcotti* Bryant).

With the publication of Mr. Bryant's excellent drawing of his new species, *Megistops walcotti,*[2] one can have little doubt that an old and hitherto unrecognized species of Olivier is at last identifiable. *Altica liturata* Oliv.[3] has always puzzled American entomologists. Horn[4] copied the figure, very imperfectly, and referred to the species as " unknown." Dr. E. A. Schwarz and possibly Horn himself, judging from his illustration, always considered it a species of *Ora,* and thus it appears as "*Oedionychis liturata* Oliv. (see genus *Ora*)" in Leng's Catalogue of Coleoptera North of Mexico. The reason it was doubtfully placed in the genus *Ora* was because the description and figure of Olivier resembled somewhat the species of that genus in color and in having abbreviated vittae on the elytra. And furthermore because of the incrassated hind legs found in Ora, that genus was originally placed by Clark among the Halticidae.[5] But although the species of the genus *Ora* are variable in their vittate markings, none of the species has ever been found to correspond at all well with the old one of Olivier. Any one comparing Mr. Bryant's drawing with Olivier's figure is struck at once by their similarity. The descriptions, too, agree, especially the description of the eyes, the distinctive character of the genus, which Olivier characterizes as "fort grands." Mr. Bryant's measurement for his species is 2.5 mm. The line measurement beside the Olivier figure is slightly less than 4 mm. This discrepancy in measurement is probably of no great importance, as the one specimen of *Megistops walcotti* in the National Museum measures slightly over 3 mm. Neither can the type locality of Olivier's species, " Caroline," be taken as ruling out its identity with the species from Porto Rico, since Olivier's habitats are sometimes inaccurate, and since he described numerous species from Santo Domingo. The specimen in the National Museum was collected by W. A. Hoffman at Mariana, Haiti.

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[2] Bryant, New Halticidae from Africa and Haiti, Ann. and Mag. of N. H., vol. 19, No. 114, 1927, p. 621.

[3] Olivier, Ent., 6, 1808, p. 707, pl. 4, fig. 70.

[4] Horn, Synopsis of the Halticini of Boreal America, Trans. Amer. Ent. Soc., vol. 16, 1889, pl. 6, fig. 24.

[5] Clark, Journ. Ent., vol. 2, No. 12, 1865, p. 385.

COLLECTING NOTES ON LEPIDOPTERA.

By Wm. Prescott Rogers, Fall River, Mass.

Junonia coenia Hübn. has been noted during 1927 in greater abundance than in several seasons. The last previous appearance of which I made a record was October 21, 1920, on the second fairway of the Rhode Island Country Club at Nayatt, R. I.

July 9, 1927.—A good specimen was captured on Brayton Beach road at Westport Harbor, Mass.

August 31, 1927.—Several specimens observed on the 8th, 9th, 10th, 12th and 15th fairways of the Kittansett Club at Marion, Mass. That day they were so numerous they appeared to have been more firmly established than transient visitors.

September 24, 1927.—At the Kittansett Club, Marion, Mass., a few rather worn specimens were noted about the Club House and 9th fairway. This was a clear, cold day, with strong N. W. wind benumbing to any insect.

NOTES ON THE GENUS HETEROCORIXA WHITE WITH THE DESCRIPTION OF SOME NEW SPECIES (HEMIPTERA-CORIXIDAE).

By H. B. Hungerford, Department of Entomology, University of Kansas, Lawrence, Kansas.

The subgenus Heterocorixa was established by F. B. White[1] in 1879 to include a species taken at Prainha, 300 miles up the Amazon River. The name Heterocorixa should be given generic rank and White's species should be known under the name *Heterocorixa hesperia* White. This interesting genus is characterized by a short, plump body, shiny surface, coriaceous hemelytra save the left membrane which is membranous, long anterior tibia, subacute production of the inferior angle of the eye, short pronotum, and strigil and asymmetry of male abdomen right. The males have not hitherto been known, White's material consisting of females only. This little paper may therefore be of some interest, aside from the new species described herein.

For a number of years, I have had in my collection a species which I had labeled *Heterocorixa hesperia* White. Through the years I have collected considerable material of this genus, awaiting the arrival of male specimens of White's species before publishing the records. Such material has now been on hand for some time. Undescribed species have come to me from my friend and former colleague, Dr. F. X. Williams, from the Cornell University Expedition of 1919, and from various South American collectors who have known of my interest in this family of insects.

Heterocorixa williamsi n. sp.

Size: 5 mm. long.

Color: Rather pale. The dark color reddish brown and the light color pale lemon yellow. Hind margin of head margined with black. Pronotum pale, with four or five reddish brown curved bands, the median of which are thicker than the others. The hemeltyra evenly mottled with the light and dark about evenly divided. The pattern in oblique series on clavus and more or less longitudinal on corium. A submarginal dark stripe extends from tip of right clavus, along the distal end of corium diverging somewhat from the margin until it vanishes in the field of the membrane.

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[1] Trans. Ento. Soc. London, Vol. 17, 3rd Series, p. 272.

Structural characteristics: Head longer than the very short pronotum which it embraces. Anterior curve of the head as seen from above broadly rounded. Head without median longitudinal carina. Inner margins of the eyes as seen from the face view plainly divergent. Facial depression of male very slight. Metaxyphus long, slender and acuminate. Male pala is shown in Figure 11. The dorsal view of the male abdomen shows a well-developed strigil and an even comb on the margin of the segment preceding it (see Figure 12). The genital capsule is shown in Figure 10.

Described from 26 specimens taken at Tena, Ecuador, February 23, 1923, by Dr. F. X. Williams.

Heterocorixa nigra n. sp.

Size: 5 mm. long.

Color: Nearly black. Head suffused with smoky black, pronotum rough, black save for a few, considerably broken, indefinite pale bands. Hemelytra black save for a few broken oblique pale figures. Limbs black save anterior femora. Thorax black, abdominal venter dusky.

Structural characteristics: Head longer than pronotum. Anterior curve of the head as seen from above, roundly acuminate. Head with very faint median carina. Inner margins of the eyes as seen from the face view, almost parallel. Facial depression slightly more marked than in preceding species. Metaxyphus long and slender. Male pala as shown in Figure 8. The dorsal view of the male abdomen shows a linear strigil and a comb on the margin of the segment preceding with longer teeth than in *H. williamsi* (see Figure 9).

Described from 6 specimens taken at Sao Paulo, Brazil, by R. Spitz.

Heterocorixa boliviensis n. sp.

Size: 5.4 mm. long.

Color: Color effect dark, the ground color being chocolate brown and dense. Pronotum rough, larger than in preceding species and crossed by eight light ragged-edged bands that anastomose here and there. Hemelytra mottled throughout with irregular crowded figures. Limbs and venter pale.

Structural characteristics: Head not longer than pronotum. Anterior curve of the head as seen from above shows the vertex advanced beyond the curve of the eye. Head with faint median carina. Inner margins of the eyes as seen from the face view almost parallel. Facial depression of male without definite margin, but more conspicuous than in preceding species. Metaxyphus long and slender. Male pala much like that of *H. nigra,* but with less irregular dorsal line. The dorsal view of the male abdomen shows a triangular strigil, and the teeth of the comb on the margin of the segment preceding, of two sorts—a curved row of long teeth to the left of the median line of the strigil, continued as a row of shorter teeth to the left margin. (See figures 4, 5 and 6).

Described from 18 specimens taken at Buenavista, Bolivia, Dept. Santa Cruz, S. A., by R. T. Steinbach.

Heterocorixa brasiliensis n. sp.

Size: 6 mm. long.

Color: Pattern meally, neither the brown nor the pale color dominant or arranged in a pattern. Pronotum and hemelytra uniform in color tone with slender brown bands on pronotum faintly visible. Inner base of clavus slightly paler than elsewhere. Venter pale, shadowy spots on lateral ventral margins of the 4th, 5th and 6th abdominal segments.

Structural characteristics: Anterior curve of the head as seen from above roundly acuminate. Head with very faint median carina. Head and pronotum subequal in length. Metaxyphus long and slender. This is a very distinct species from standpoint of structure, the male pala possessing very few pegs and the clasper being broad and flat. The strigil is smaller than for the other species, although the species is larger. The comb of teeth on caudal margin of preceding segment reduced to a very few which lie in front of the strigil. (See Figures 13, 14 and 15.)

Described from six specimens taken by Cornell Univ., Exp., Corumba, Brazil. Matto Grosso, Dec. 14–22, 1919.

Comparative notes: This species is larger than the *Heterocorixa hesperia* White. The head is a trifle longer and the interocular width appears less than those insects which came from the general region of the lower Amazon and which I have called *Heterocorixa hesperia* White. The male characters are also different.

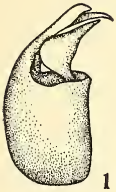
Heterocorixa hesperia White, variety, **chapodiensis** var. n.

This form resembles very closely the material from the vicinity of Para. It is, however, a little smaller and there is even a possibility that it is a distinct species. The male pala, dorsum of abdomen and male genital capsule are shown on Figures 1, 2 and 3.

EXPLANATION OF PLATE III

Fig. 1. *Heterocorixa hesperia* Whit., var. *chapodiensis,* var. n., male genital capsule.
Fig. 2. *Heterocorixa hesperia* White., var. *chapodiensis,* var. n., pala of male.
Fig. 3. *Heterocorixa hesperia* White., var. *chapodiensis,* var. n., dorsum of male abdomen.
Fig. 4. *Heterocorixa boliviensis* sp. n., male genital capsule.
Fig. 5. *Heterocorixa boliviensis* sp. n., pala of male.
Fig. 6. *Heterocorixa boliviensis* sp. n., dorsum of male abdomen.
Fig. 7. *Heterocorixa nigra,* sp. n., male genital capsule.
Fig. 8. *Heterocorixa nigra,* sp. n., pala of male.
Fig. 9. *Heterocorixa nigra,* sp. n., dorsum of male abdomen.
Fig. 10. *Heterocorixa williamsi,* sp. n., male genital capsule.
Fig. 11. *Heterocorixa williamsi,* sp. n., pala of male.
Fig. 12. *Heterocorixa williamsi,* sp. n., dorsum of male. abdomen.
Fig. 13. *Heterocorixa brasiliensis,* sp. n., male genital capsule.
Fig. 14. *Heterocorixa brasiliensis,* sp. n., pala of male.
Fig. 15. *Heterocorixa brasiliensis,* sp., n., dorsum of male abdomen.

A Minor Rectification.—In this BULLETIN (p. 272, vol. XXII), in a discussion of the number of segments in the hemipterous rostrum, McAtee names several species. One of these is *Salda ligata,* which properly belongs in the genus *Pentacora* as defined by Reuter. His use of the specific name *mulsanti* for our common Eastern *Mesovelia* may be allowable, but, as I have pointed out elsewhere, Champion's dictum may be ignored in view of the fragmentary character of descriptions in this genus, excepting those lately described by Hungerford. For this reason, I hold that the name *bisignata* Uhler should be maintained. Blatchley, in his Manual, however, adheres to *mulsanti.*—J. R. DE LA TORRE BUENO, White Plains, N. Y.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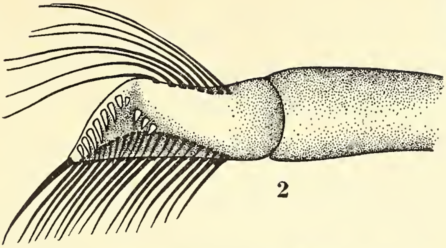
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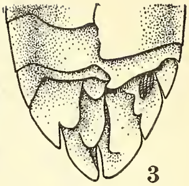
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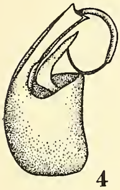
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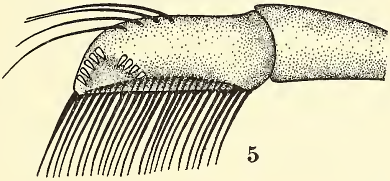
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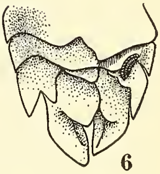
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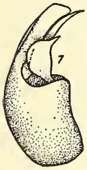
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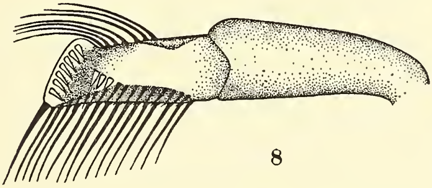
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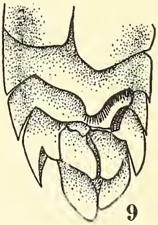
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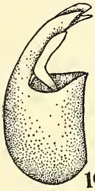
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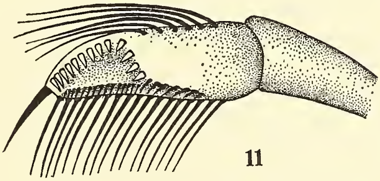
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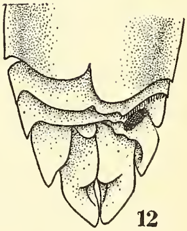
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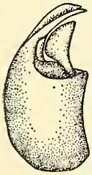
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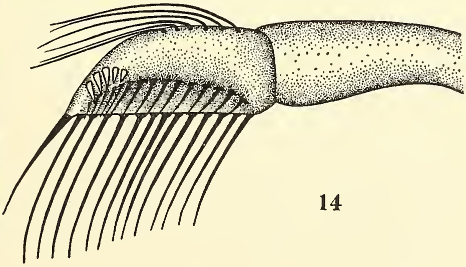
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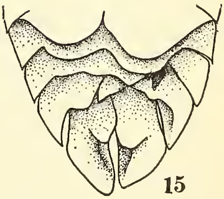
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REMARKS CONCERNING THE DISTRIBUTION AND HOSTS OF THE PARASITIC ANT FUNGUS, LABOULBENIA FORMICARIUM THAXTER.*

M. R. Smith, A. & M. College, Mississippi.

In the Bulletin of the Brooklyn Entomological Society, Volume 15, pages 71–79 for 1920 there is a very excellent article by Dr. J. Bequaert discussing the parasitic fungi of ants. Among the fungi which he mentions as attacking ants is the species *Laboulbenia formicarium* Thaxter, our most common North American species. He states that the fungus has been taken on the following species of ants: *Lasius niger* var. *americanus* Emery, *Lasius niger* var. *neoniger* Emery and *Formica neogagates neogagates* Emery. In a more recent article on this species of fungus, however, pages 397–398 of the Ants of the Belgian Congo, Bull. Amer. Mus. of Nat. Hist., Vol. XLV, 1922, he records another host for it, *Formica pallide fulva* subsp. *schaufussi* Mayr., this making a total of only four species of ants on which the fungus has been noted to occur. After discussing at some length the taxonomical affinities of the fungus, its general appearance, mycology, distribution, and hosts, he remarks to this effect, "But strange to say, it has been recorded thus far only from the vicinity of Boston, where it is of rather frequent occurrence (Cambridge, Ellisville and Forest Hills). There is apparently no reason why it should not be found in many other localities, when properly looked for."

This remark has been mainly instrumental in causing the writer to publish the various notes which he has accumulated on the fungus during his 13 years of study of ants. He will mention here very briefly the new hosts on which he has found the fungus and also the new localities from which it has been taken; for other remarks on the fungus, the reader is referred to the articles by Bequaert and Wheeler mentioned in the bibliography to this article.

The writer first encountered this fungus at Columbus, Ohio, in 1917. Here he found it infesting a colony of *Lasius niger* var. *americanus* Emery. Since an article mentioning the discovery of this fungus appeared in Vol. 10 of the Journal of Economic Entomology for 1917 (see bibliography), the writer will not discuss the matter further. It might be said however, that Bequaert in the two articles previously referred to apparently overlooked the note in the Journal of Economic Entomology, otherwise he apparently would not have remarked that the fungus was known only from localities around Boston.

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* Contribution from the Mississippi Agricultural Experiment Station.

The fungus, strange to say, was not encountered again by the writer until 1926, although during the period from 1917 to that date he collected, examined and determined thousands of ants from many sections of the country. In 1926 it was encountered on two adjacent blocks in the city of Urbana, Illinois. These blocks were on a well drained slope, in contrast to the marshy area where Wheeler found the fungus on ants at Ellisville, Massachusetts. Here the fungus was found affecting four species of ants, namely: *Lasius niger* var. *neoniger* Emery, *Formica pallide fulva schaufussi* var. *incerta* Emery, *Formica neogagates neogagates* Emery and *Formica fusca* var. *argentea* Wheeler. Other species of ants on these blocks were examined for the fungus but none was found on them. Among the species of ants examined, were: *Myrmica scabrinodis* var. *sabuleti* Meinert, *Prenolepis* (*Nylanderia*) sp., *Aphaenogaster fulva* Roger, *Camponotus herculeanus* subsp. *pennsylvanicus* DeGeer, and *Tapinoma sessile* Say.

In 1926 a collection of ants was received from Mr. C. N. Ainslie, Assistant Entomologist of the Bureau of Entomology. Among the species which he sent were a number of workers of two species, *Formica pallide fulva schaufussi* var. *incerta* Emery and *Formica fusca* Linn. that were infected with the fungus. The ants were collected at Sioux City, Iowa.

Recently a small number of ants for determination were received from Dr. Z. P. Metcalf of the North Carolina State College. Among them was the species, *Lasius niger* var. *americanus* Emery, which had been collected at Raleigh, North Carolina. This species was represented by workers, and alate males and females, all of which were parasitized by the fungus.

Several facts concerning the fungus have struck the writer's attention, namely: first, that the fungus although apparently covering a wide area, possibly all of North America, is certainly sporadically distributed; second, that the ants which are affected by the fungus belong to two genera only of the same subfamily and are therefore closely related phylogenetically; third, that the workers of every one of the infected species are noted for the production of a large amount of formic acid. The question has naturally arisen in the writer's mind as to whether the acid-producing quality of the ants has anything to do with their infection by the fungus.

Further collecting and study of ants will undoubtedly show a wide distribution of *Laboulbenia formicarium* Thaxter, but will it add any new hosts for the fungus other than those species belonging to the genera *Lasius* and *Formica* of the subfamily *Formicinae* (*Camponotinae*)?

SUMMARY

1. Ants which have been found to be new hosts for the fungus, *Laboulbenia formicarium* Thaxter, are: *Formica fusca* Linn., *Formica fusca* var. *argentea* Wheeler and *Formica pallide fulva schaufussi* var. *incerta* Emery. This makes a total of seven species of ants which are known hosts of the fungus.
2. Additional localities from which the fungus has been taken besides the localities mentioned by Bequaert are: Columbus, Ohio; Urbana, Illinois; Sioux City, Iowa, and Raleigh, North Carolina.
3. The fungus although probably occurring over all North America appears to be sporadically distributed. It is worth mentioning here that although the writer has collected and examined more ants from Mississippi than from any other state, the fungus so far has not been observed in this state.
4. It is confined to species of ants of two genera, *Lasius* and *Formica,* both of which belong to the same subfamily, *Formicinae* (*Camponotinae*). It is a remarkable fact that the fungus is confined to these ants whose workers are especially noted for the production of a large amount of formic acid.

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BOOK NOTES.

Biologie der Hymenopteren. Eine Naturgeschichte der Hautflügler. By Dr. H. Bischoff. (Published by Julius Springer, Berlin, 1927.) One volume octavo of viii + 598 pp., with 224 figures.

A decade or so ago the hue and cry among scientists of a certain class was that the Germans were a race of mere compilers, who never unleashed an original thought in the field of Science. Meanwhile, however, it has been amusing to note that even the most violent iconoclasts of everything German forgot to discard from their studies those very Handbücher, Grundrisse, Compendia, Kataloge, Syllabi, and what-nots, they were so eager to denounce as worthless. The sad truth was that they could not possibly have managed without them. Verily, what would become of Science if there were not painstaking souls willing to devote years of wearisome toil to the monotonous task of collecting, sifting and arranging the many scattered fragments of human knowledge? Scientists are to be congratulated that the Germans have resumed their pre-war tradition, and that, in addition to continuing existing works of reference, they have had the courage to inaugurate several new series. One of these, edited by Professor Walther Schoenichen, is entitled "Biologische Studienbücher" (Biological text-books). Five parts have appeared thus far, the fifth being Dr. Bischoff's "Biology of the Hymenoptera: A natural history of the hymenopterous insects," to be reviewed here.

Bischoff's book sets an excellent standard of just what such a "*mise au point*" ought to be. It presents an admirable panorama of the life and strife of bees, wasps, ants, and their lesser-known relatives. Moreover, it is not a bare compilation; for, quite apart from the critical acumen displayed in sifting the chaff from the wheat, a personal working acquaintance with the original facts frequently stands the author in good stead. In matters theoretical, he discusses most of the current opinions, as a rule in a fair and dispassionate manner, and his judgment seems to be particularly free from any of the prevailing biological fads.

Let us hope that Bischoff's "Biology" will help to dispel the common fallacy, prevalent even among biologists, that the entomologist's interest does not transcend the several forms of finesse which may give him the innocent pleasure of introducing a new Latin vocable. As a matter of fact, the habits, behavior, and psychology of insects are probably more intimately known than those of other animals. It would be strange indeed if it were otherwise. For, within the order Hymenoptera alone one meets with every one of the "broader" problems of general biology. In many cases, the opportunities for studying them are unusually promising, because the available material is vastly superior in variety and scope to that presented by any other group of living beings. I trust that even a cursory analysis of Bischoff's book will show how the study of hymenopterous insects is not only supremely captivating to the born naturalist, but may also be of much profit to the progress of biology as a whole.

Bischoff introduces his subject with an account of external anatomy, classification, phylogeny, and geographical distribution. This is perhaps the least satisfactory part of the book, and one may well wonder whether some of these topics might not as well have been left out completely, since they are not, strictly speaking, biological. Chapter II, entitled "Motion and Rest," deals primarily with the physiology and mechanics of flight; but the movements of the legs, abdomen, and antennae, as well as motion in the larval stage, are briefly studied. One finds here some account of resting stages, hibernation, estivation, and sleeping habits. The nocturnal habits, exceptional in the order, are also mentioned. The third chapter is devoted to "Nutrition," and it is pleasing to see that it covers not less than sixty pages. After all, the urge of hunger is of far greater import in the life of the individual than either the appetency of sex or the instinct of fear, though I willingly admit that it is wholly devoid of romantic glamor. Moreover, in the course of evolution, the morphology of the insect appears to have been influenced more profoundly by the feeding habits than by its other activities. Bischoff's account is quite illuminating in this respect. Considering the wide field of adaptive radiation covered by the mouth-parts of Hymenoptera, it is rather surprising that these insects never developed blood-sucking habits, such as are found among several of the other orders. Chapter IV, dealing with respiration and circulation, is largely physiological. In Chapter V the nervous system and the sensorial life are discussed at length, inasmuch as they are of foremost importance for an understanding of insect behavior. The sense of smell is predominant in Hymenoptera, as in other insects. Bischoff rightly points out that, since this sense is but poorly developed in the human species, it is extremely difficult for us to fathom the possibilities which smell affords to an insect.

With Chapter VI, dealing with the nests of the solitary aculeates, we enter upon the field of what is more properly speaking "biology" (ethology or ecology), *viz.*, the study of the behavior of the insect. This and the following chapters contain such a plethora of interesting facts that even a summary would run much beyond the bounds of a review. Chapter VII is devoted to the nests of the social Hymenoptera; Chapter VIII, to the eggs and methods of oviposition; Chapter IX, to the care of the offspring; Chapter X, to parasitism; Chapter XI, to social life; Chapter XII, to sexual life, and Chapter XIII, to the ontogeny or individual development. The discussion of the evolution and significance of social behavior among Hymenoptera is not as extensive as one might have expected. The author evidently felt that the subject is given sufficient prominence in some of the recent treatises by Reuter, Wheeler, Wasmann, Forel, von Buttel-Reepen, Bouvier, and others. The concluding chapter (XIV) covers a number of topics which the author seemed unable to discuss logically elsewhere. It also touches, too briefly in my opinion, upon the ever-increasing economic importance of the Hymenoptera. The appended bibliography, covering twelve pages, includes but a selection from several thousand publications upon the subject.

In an attempt at appraising any scientific treatise, the critic should of course keep in mind the purpose for which it was written. Now it is quite evident that Dr. Bischoff's book was intended to be didactic. Two types of readers may be expected to use it: the beginner will welcome it as the "Open sesame" to the fascinating study of the Hymenoptera; while the more advanced student will often reach out for it to clear up some particular of insect behavior.

The usefulness of the book within its scope of logical readers depends then no less upon the method of presentation than upon the selection of material. With the author's choice of facts I can have no serious disagreement. It would be well nigh impossible to present a more comprehensive assortment in the same number of pages. I fear, however, that Dr. Bischoff has not been equally successful with the method of presentation, which, to my mind, should have striven for the utmost clearness and the greatest facility of reference in every instance.

The most obvious system of arranging the manifold activities of insects into a logical whole, seems to be to take up in succession the behavior of each of the main taxonomic groups. This method brings order almost automatically out of the chaos of facts, while it greatly facilitates future reference to any given point. Moreover, it has a decided didactic advantage in presenting, as it were, complete biographies of some particularly interesting types. There is also an undeniable correlation between taxonomic kinship and habits, which should not be overlooked; while the discrepancies that may occasionally be observed raise interesting problems of evolution. If the need were felt for a more general study of certain phases of insect behavior, the purely taxonomic treatment might readily be supplemented with a few introductory or concluding chapters, which then would not be encumbered with a mass of detail.

Dr. Bischoff, however, chose the alternative method of gathering the many observations into a series of chapters each devoted to one of the fundamental phases of insect behavior. Undoubtedly he thus succeeded in giving to his work a more "scientific" look, so that his treatise should strongly appeal to the scholastic zoologist who fights shy of taxonomy. There is no gainsaying, too, that a comprehensive presentation of the general trend of evolution of insect behavior in its several aspects may be extremely suggestive. Yet even this advantage of the method was mostly lost by the author, because he was forced to cram his accounts with so many facts that the leading principles are generally lost sight of by the reader. Furthermore, reference to some particular topic is extremely difficult, and is but partly helped by the analytical table of contents and by the two concluding indexes.

The type of the book is pleasing to the eye and the paper is of better quality than we have become accustomed to for entomological printing. Typographical errors are remarkably few, although the author's list of errata does by no means cover them all. It is, however, to be regretted that so many of the illustrations are of decidedly poor workmanship. Some (as Fig. 158) are crude sketches that do not do justice to the subject. Under the conditions now prevailing in the book industry, the price

(Reichsmark 27.—, or about $7.00) cannot be regarded as exorbitant.

J. Bequaert,
Department of Tropical Medicine of Harvard University Medical School.

Preparation of Scientific and Technical Papers, by Sam F. Trelease and Emma Sarepta Yule. (Williams & Wilkins Company, Baltimore, $1.50).

Far be it from this editor even to appear to insinuate that any entomologist whatsoever is in need of this small work! Notwithstanding, it is well to have before one for occasional use such a book as this, which is replete with suggestions as to proper treatment of scientific data to show what it is meant that they should mean; to plan and order topics in a general outline. With these as a beginning it gives the mechanism of preparing a paper for publication, from start to *finis.* This is a really useful work, which might well be at hand whenever a paper is in course of incubation and in active embryological development. Even this editor—we say it with blushes—has found in it many things not covered by his editorial sufficiency. We recommend it to all authors of scientific papers, particularly those on entomology, whereby much editorial gray matter may be saved for future purposes.—J. R. T. B.

EXCHANGES.

This one page is intended only for wants and exchanges, not for advertisements of articles for sale. Notices not exceeding THREE lines free to subscribers. Over lines charged for at 15 cents per line per insertion.

Old notices will be discontinued as space for new ones is needed.

WE WISH to procure in exchange or on cash: *Parnassius of North-America,* with his varieties and aberrations, well labelled, spread or in papers (clodius, smitheus, eversmanni). Dr. Staudinger & A. Bang-Haas, Dresden-Blasewitz.

THE MUSEUM of the Brooklyn Institute has a few uncolored sets of the Calverly, Weidenmeyer and Edwards plates of North American Sphingidae for exchange or for sale at $5 per set. Address, Librarian, Brooklyn Museum, Eastern Parkway, Brooklyn, N. Y.

LEPIDOPTERA from the Mountains of Kentucky. Papilios and other var. of this section collected. Paper spec. of *Xylophanes tersa* and *Catopsilia eubule* on hand. Also Cocoons of the larger Saturnid moths. Ellis Chandlee, Barbourville, Ky.

BUTTERFLY COLLECTORS.—Have you aberrations or freak butterfly specimens for sale or exchange? Professional and private collectors please write. Jeane Gunder, Pasadena, Calif.

CYNIPIDAE.—Galls and bred wasps wanted to determine or in exchange. Alfred C. Kinsey, Indiana University, Bloomington, Indiana.

WANTED.—Am studying the bionomics of the corn billbugs and desire the privilege of examining *Calendra* (*Sphenophorus*) from all parts of the world. A. F. Satterthwait, U. S. Entomological Laboratory, Webster Grove, Mo.

DIURNAL LEPIDOPTERA.—Have many desirable western species to exchange, including *Argynnis atossa, macaria, mormonia, malcolmi, nokomis; Melitaea neumoegeni; Lycaena speciosa;* etc. Send lists. Dr. John A. Comstock, Southwest Museum, 4699 Marmion Way, Los Angeles, Calif.

WANTED.—Ants from all portions of the United States for determination or exchange. Will also exchange other insects for ants. M. R. Smith, Assistant Entomologist, State Plant Board, A. and M. College, Miss.

CATOPINI: *Catops* (*Choleva*), *Prionochaeta, Ptomaphagus.* —Wanted to borrow all possible specimens of these genera from North America for a revisional study. Correspondence solicited. —Melville H. Hatch, Dept. of Zoology, Univ. of Wash., Seattle, Wash.

COLEOPTERA wanted.—Will collect insects of any order in exchange for Silphidae, Scarabaeidae and Cerambycidae. P. Schiffer, 20 First Avenue, New York City.

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OF THE

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BULLETIN
OF THE
BROOKLYN ENTOMOLOGICAL SOCIETY

Vol. XXIII June, 1928 No. 3

THE BASAL STRUCTURES OF THE WINGS OF CERTAIN INSECTS

By G. C. Crampton, Ph. D.
Massachusetts Agricultural College, Amherst, Mass.

In Vol. 34, p. 68, of Psyche for 1927, I have called attention to the occurrence in roaches, mantids, termites, heteropterous Hemiptera, etc., of a peculiar basal wing fold or ridge, the basoplica *bp* (of all figures), with a corresponding pocket or marsupium *bs,* apparently developed among certain "Neopterygotan" insects in connection with their ability to lay the wings along the top of the abdomen in repose. In the present paper, I would point out that the basal fold and marsupium may be well developed in the fore wings of other insects as well as those previously described and I would likewise point out the relation of the structures in question to the other parts of the wing.

Before taking up the discussion of the relation of the fold and pocket to the other structures of the wing, I would call attention to certain "landmarks" along the lateral margin of the eunotum, or wing-bearing plate, whose posterior margin is continued in the posterior margin of the wing.

The prealar sclerite *pra,* extends in front of the wing, toward the pleural region. Behind it is the suralar sclerite *sa,* which forms an anterior pivotal point for the wing. Between the two sclerites is the tegular incision *ti,* in, or near which, is located the tegula *tg* of all figures. In many Lepidoptera, a subtegular sclerite *st* of Fig. 2, helps support the tegula *tg* (indicated by cross hatching in Fig. 2), which is usually large in the Lepidoptera, and is somewhat smaller in the Trichoptera (Fig. 1). In the Homopterous Hemipteran (Cicada) shown in Fig. 4, the tegula is absent, but in other Homoptera, such as the Fulgoroidea, the tegula may be well developed. In the Orthoptera, the tegula is usually small, and is difficult to identify. While the narrow sclerite labelled *tg* in the Orthopteron shown in Fig. 3 is probably correctly identified, it is not impossible that the small sclerite situated at the left of this sclerite may represent the tegula.

The parategula or basicosta *ptg* is a sclerite situated near the the tegula *tg*. The sclerite *ptg* may represent a detached basal portion of the costal region of the wing, but its origin has not been definitely determined. In the Lepidopteron shown in Fig. 2 and in the Homopteron shown in Fig. 4, the parategula *ptg* is attached to the head of the subcostal vein labelled *sc*.

Behind the suralar sclerite *sa* (which serves as an anterior notal pivotal point of the wing) is the adnotal sclerite *an* (of all figures), which extends toward the alar ossicle *n*, and forms a second anterior notal pivotal point of the wing. The adnotal sclerite *an* is usually much better developed in the higher than in the lower insects, and the fact that it is not equally well developed in all insects doubtless accounts for the fact that it has not been described before.

Between the sclerites *sa* and *an*, is the notal incision *ni* (of all figures) near which is located the notale or notopterale *n*, which is one of the most important of the alar ossicles. This alar ossicle is apparently a detached portion of the lateral margin of the notal region, and in such insects as the Embiids it is still only partially detached from the notal region, as may be seen by referring to Fig 3 of Plate I, in Vol. 25 of Psyche for 1918 (the sclerite is labelled *np* in the figure referred to). The character of the notale or notopterale in the Embiids, Plecoptera, Dermaptera and Coleoptera is illustrated in Plate I of Vol. 25 of Psyche for 1918; its character in the Hymenoptera, Trichoptera, Mecoptera, Lepidoptera, Neuroptera and Diptera is shown in Plate II of Vol. 26 of Psyche for 1919; and its character in the mantids, roaches and termites, is shown in Plate II of Vol. 34 of Psyche for 1927. The notale *n* is frequently prolonged anteriorly, forming a narrow neck-like region. In the house cricket this neck-like region becomes detached from the rest of the sclerite, and in the Trichopteron shown in Fig 2, this neck-like region is demarked from the remainder of the sclerite *n*. The head of the subcostal vein *sc* abuts against the head of this neck-like region of sclerite *n*, and this fact is of some importance in identifying the subcostal head. Furthermore, the median ossicles labelled *m* in all figures, form an anterior series of plates extending from ossicle *n* to the basal fold *bp,* as will be discussed later.

Behind the abnotal process *an,* is the adanal process *al* of Figs. 1 and 2. This process is short and stout in most Orthopteroid insects, while in most Holometabola, particularly in the higher forms, it is long and slender. In Fig. 3, it is partially detached from the notum and in Fig. 4 it becomes completely detached to form the alar ossicle *ad* called the adanale. In the Plecoptera the ossicle *n* extends back to the adanal process *ad,* and in the Embiids the ossicle *n* is attached to the adanal process *ad.*

The adanal sclerite *ad* forms a posterior notal pivot for the wing, and behind it there sometimes occurs a postadanal process *p* of Figs. 1, 2 and 4, which forms a second important posterior pivoting process of the wing, although this process has apparently been hitherto overlooked. The incision in front of the process *ad* is the adanal incision and the incision behind it is the postadanal incision.

The basanal ossicle *ba,* and the anal ossicle *a,* which may be merely a detached portion of the ossicle *ba,* extend from the adanal sclerite *ad* toward the postero-basal region of the anal area *aa* at the base of the basal fold *bp* (in all figures). We thus have a posterior series of sclerites *ba* and *a,* extending from the posterior process *ad* toward the basal fold *bp,* and likewise (as was described above) an interior series of sclerites *n* and *m* (of all figures) extending from the anterior processes *sa* and *an* to the basal fold *bp.* The fact that there are two series of plates extending from processes of the notum to the basal wing fold *bp* is of importance in determining the relation of this fold to the other parts of the wing and notal region. It should be noted, however, that the anterior sclerites *m* are also associated with the heads of certain veins, and the ossicle *ba* is also associated with the ossicles *m,* so that the basal fold of the wing is not the only structure these sclerites are associated with.

The basal wing fold or ridge *bp* is situated in the antero-basal part of the anal area or clavus *aa* of Fig. 3, and forms a very important basal arch of the anal veins in many insects which are capable of laying the wings along the top of the abdomen in repose. The pocket or marsupium *bs* is located between the basoplica *bp* and the median ossicles *m* and the heads of certain veins;

and the purpose of this pouch is apparently to enable the chitinous parts of fold around the basal ridge *bp,* when the wings are laid back in repose.

The claval rima, or crack-like line *cr* of Fig. 3 usually extends from the marsupium *bs* outward along the front of the anal or claval area *aa,* while the axillary rima *ar* of Fig. 1 *may extend* from ossicle *ba* or *a* outward along the front of the axillary region *ax* located behind the anal area. A median rima extends from a point near the origin of the claval rima outward across the median veins, and then continues outward along their anterior border in the fore wing of the roach. The two rimae labelled *r* in the Trichopteron shown in Fig. 1 may represent the claval rima and a cubital rima, but this point has not been definitely determined.

The purpose of the foregoing discussion is to point out that a basal fold *bp* and marsupium *bs* occur in the wings of insects other than those described in Vol. 34, p. 59, of Psyche, for 1927. These structures and the alar ossicles should be of great value in determining the homologies of the veins in different insects, since the alar ossicles in particular change but little from group to group, and nothing that promises to be of aid should be neglected in attempting to solve the difficult problem of interpreting the wing venation throughout the Pterygotan orders!

ABBREVIATIONS.

a....Anal sclerite (anale).
aa...Anal area or clavus.
ad...Adanal sclerite (adanale).
an...Adnotal sclerite (adnotale).
ar...Axillary rima.
ax...Axillary area or jugal area.
ba...Basanal sclerite (basanale).
bp...Basoplica or basal ridge.
bs...Marsupium or basosinus.
cr...Claval rima.
m...Median ossicles (medialia).
n....Notal ossicle (notale).
ni...Notal incision or “sinus.’
p....Postadanal sclerite (postadanale).
pra..Prealar sclerite (prealare).
ptg..Parategula or basicosta.
r....Rimae (cubital and claval?).
sa...Suralar sclerite (suralare).
sc...Subcostal head.
st...Subtegula.
tg...Tegula.
ti....Tegular incision.

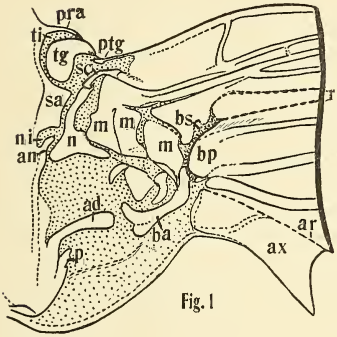
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Fig. 1

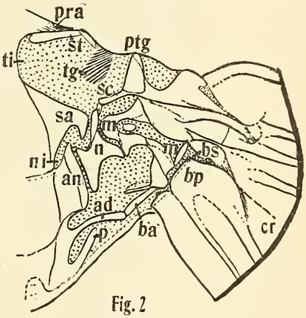
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Fig. 2

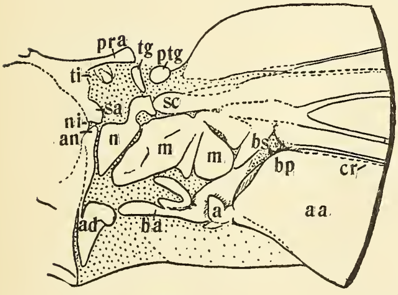
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Fig. 3

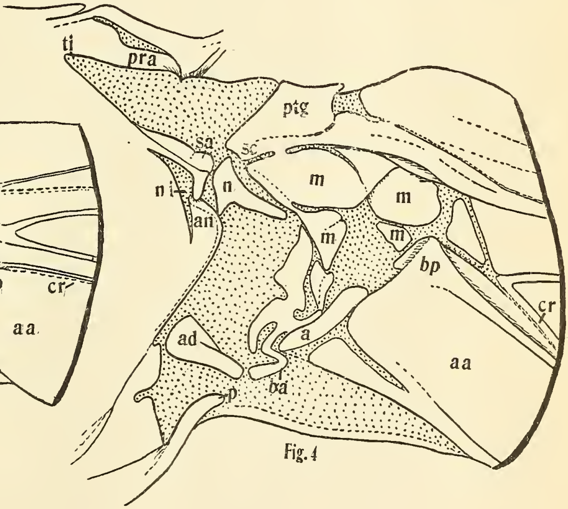
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Fig. 4

Explanation of Plate IV.

Fig. 1. Margin of notum, alar oscicles and bases of the veins of the right wing of the Trichopteron *Neuronia* (*semifasciata?*), seen from above.
Fig. 2. Same of the Lepidopteron *Ctenocha virginica.*
Fig. 3. Same of the Orthopteron *Scaphura* sp.
Fig. 4. Same of the Hemipteron.

LUCILIA FLIES ANTICIPATING DEATH.

By William T. Davis, Staten Island, N. Y.

When we approached the landing place on the Wingina side of the James River in Virginia, on August 12, 1927, Col. Wirt Robinson and the writer heard a kitten crying, and directly we found the little animal very thin and very anxious to have us take it in charge. Three times it climbed up the leg of my trousers as far as my coat, and would have continued if I had not put it back each time on the ground. It was in great trouble; nearly starved to death and very thin. I gave it one of my two biscuits that I had brought along for lunch, and although it was really a brown sugar sandwich, and not very suitable cat-food, the kitten eagerly devoured it. But what chiefly interested us was that the green-bottle flies had discovered the sad plight of the kitten and that no doubt it would soon die, so they had anticipated death and commenced laying eggs on its fur, particularly near the tail. A pint of milk would probably have made their efforts to continue their kind of no avail, and we hope that the sugared biscuit had a like result. Col. Robinson removed all of the fly eggs that he could discover, while I took a photograph, and when we returned in the late afternoon to the landing place, which is a long distance from any house, the kitten was not to be seen. The kitten did not appear to be wounded in any way, but was simply weak and ill for the want of food.

One of the four flies captured while they were flying about the kitten, was sent to Prof. O. A. Johannsen, of Cornell University, and kindly identified by him as *Lucilia australis* Townsend, a species resembling *Lucilia caesar* L., with which it was formerly confused. Several species of flies lay their eggs about wounds, and species of *Lucilia* are often found on dead animals. They are sometimes troublesome as wool maggots of sheep.

A NEW NEPA (HEMIPTERA–NEPIDAE).

By H. B. Hungerford, University of Kansas, Lawrence, Kans.

Through the assistance of Dr. Teiso Esaki I am able to describe a pair of Nepas in my collection as new. Dr. Esaki has been kind enough to describe to me in modern terms the named species which it has been his privilege to examine in the European museums.

The differential specific characters of antennae and male genital capsule were overlooked until recently, and yet they offer the best structural characters for separating the species. I believe the most readily determined Nepa is Dr. Esaki's *Nepa hoffmanni.* This is a very broad species with exceedingly short respiratory tube. The other species resemble one another superficially and the only proper way to place a species is to relax a specimen and examine its antennae and, if it be a male, the genital capsule also.

For many years the only known species were: *Nepa cinerea* Linn. (now shown to be *Nepa rubra* Linn. by Dr. Esaki) and its variety *Nepa minor; Nepa primitiva* Mont. and *Nepa apiculata* Uhler. In searching for some satisfactory way of separating *Nepa cinerea* Linn. and *Nepa apiculata* Uhler, I was pleased to find that the antenna of the former appeared branched, while that of the latter was not. Differences between the male genital claspers were also found. Recently three more species have been described, namely *Nepa hoffmanni* Esaki, *Nepa chinensis* Hoffmann and *Nepa seurati* Bergevin.

Dr. Teiso Esaki described *Nepa hoffmanni* from four females taken in North China (Tsingtau) by Prof. W. H. Hoffmann in May, 1913, and deposited in the Deutsches Entomologisches Institut der Kaiser-Wilhelm-Gesellschaft, Berlin-Dahlem. The description and figure of this species appeared in the *Entomologische Mitteilungen,* XIV, Nr. 5/6, pp. 313–314, Oct. 10, 1925. Before Doctor Esaki's description appeared I had specimens of this species in my collection from Peking, China. One specimen is a male and the following notes on this sex may be of value. The male in our collection may be called the allotype.

Nepa hoffmanni Esaki: Male allotype from Peking, China, taken by P. W. Claassen, April 16, 1925.

Size: Length, 20 mm. not including the characteristically short respiratory tube which is 2.5 mm. long. Smaller than the female specimen taken with it, the abdomen not so broad. Length of lateral margin of pronotum, 4.3 mm.; median length of pronotum, 3 mm.; the anterior part: posterior part:: 2:1. Length of scutellum, 3 mm. Length of hemelytral suture, 4 mm. Width of head, 2.5 mm. Width of anterior part of pronotum, 5 mm.; width of posterior part of pronotum 6.3 mm. Greatest width of abdomen, 7.5 mm.

Structural Characteristics: Sculpturing and color as in female. Membrane of hemelytra distinct, reticulate with network of veins. Anterior femora more slender than those of female; middle and hind femora longitudinally grooved above on broad side. Genital plate broadly rounded and bluntly pointed.

Comparative Notes: The genital plate of the male is more elevated and less pointed than in *Nepa rubra* Linn. or *Nepa apiculata* Uhler.

William E. Hoffmann described *Nepa chinensis* from specimens he had taken in South China (Canton). His description appeared in the *Lingnaan Agricultural Review*, Vol. 3, No. 1, p. 39 (issued Oct. 19, 1925). As Mr. Hoffmann describes his species, it is smaller and more slender than *N. cinerea* being between *Nepa* and *Curicta* in the latter respect. The description of the antennae and the genital capsule together with the slender form is quite suggestive of *Laccotrephes simulatus* Mont. (China) and *Laccotrephes maculatus* (Java). I am of the opinion that the presence of an inner basal projection on the anterior femor of *Laccotrephes* separates that genus from Nepa. I have never seen a Nepa with such a projection. Dr. Esaki writes me that some *Laccotrephes* species do not possess the projection, but in that case the shape of the thorax is characteristic.

Dr. Ernest de Bergevin in the *Bulletin de la Société d'Histoire Naturelle de l'Afrique du Nord,* Tome Dix-Septième, pp. 290–294, Décembre, 1926, figured and described *Nepa seurati* from Tunis. This species is marked by very broad anterior femora.

Nepa sardiniensis sp. n.

Size: Male measures 15 mm. in length (only 13 mm. to tip of wings) with a respiratory tube 8 mm. long. The greatest width of pronotum is 4.2 mm. The female measures 19 mm. in length and has a pronotum width of 5.6 mm.

Color: Same as other species. The dorsum of abdomen orange and red.

Structural Characteristics: Antenna is unbranched. Anterior femur, tibia and tarsus stouter than in *N. cinerea* and the trochanter more connate. In the female the last ventral segment of this new species is not as constricted and sharp pointed as in *N. rubra* Linn. The length of the anterior part of pronotum is to the length of the posterior part as 6.5 : 2.7. The length of the scutellum is to the hemelytral suture as 9.5 : 13. The clasper is shown on Plate V.

The species of Nepa as now known may be separated as follows:

A. Antenna with penultimate segment bearing a prolongation making it appear two branched.
  B. Prolongation of penultimate segment longer than the ultimate. . . . . *Nepa chinensis* Hoffmann.
  BB. Prolongation of penultimate segment shorter than the ultimate.
    C. Prolongation of penultimate segment about half as long as ultimate.
      Nepa rubra Linn. (= *N. cinerea* Linn.)
    CC. Prolongation of penultimate segment more than half as long as ultimate.
      Nepa primitiva Mont.
AA. Antenna without lateral prolongation on the penultimate segment.
  B. Respiratory tube very short (3 mm.) a robust species. . . . . *Nepa hoffmanni* Esaki
  BB. Respiratory tube usually at least 7 mm. long, more slender species.
    C. Anterior femur very broad at base and last segment of antenna stout. . *Nepa seurati* Bergevin.
    CC. Anterior femur of normal proportions and last segment of antenna slender and more than twice as long as penultimate.
      N. sardiniensis sp. n.

Plate V.

Fig. 1. One of the male claspers of *Nepa sardiniensis* sp. n.
Fig. 2. One of the male claspers of *Nepa apiculata* Uhler.
Fig. 3. Antenna of *Nepa sardinensis* sp. n.
Fig. 4. One of the male claspers of *Nepa rubra* Linn. (= *Nepa cinerea* Linn.)

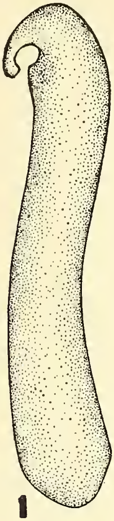
Fig. 5. Antenna of *Nepa apiculata* (Uhler.)
Fig. 6. Antenna of *Nepa rubra* Linn. (= *Nepa cinerea* Linn.)
(N = ultimate segment. P = penultimate segment.)
(L = lateral prolongation of penultimate segment.)
Fig. 7. Antenna of *Nepa hoffmanni* Esaki.
Fig. 8. One of the male claspers of *Nepa hoffmanni* Esaki.
(25165)

NOTE ON THE BREEDING OF HERMETIA AURATA BELL. STRATIOMYDAE (DIPTERA).

By George P. Engelhardt, Brooklyn Museum.

On June 19, while collecting with Douglas Duncan, of Globe, Arizona, in the Sierra Ancha Mountains, a decaying log of oak alongside a stream bed produced among other insects a peculiar flat, tough-skinned and legless larva which aroused my curiosity and for the time being was placed in a small cork-lined box and forgotten. Two months later when examining the summer's collections this box came to hand again. Some of the insects pinned in it had been partly eaten and destroyed. The only trouble maker that could be found, tightly wedged in a crevice of the cork lining, was the tough-skinned larva from Arizona. It wriggled sluggishly when removed from its hiding place and was allowed to remain in the box after all other contents had been taken out. When next examined, on September 3, the box contained a handsome specimen of the fly *Hermetia aurata.* The empty larval skin showed a rupture behind the second segment dorsally. So little has been published regarding the habits of our North American Diptera of the family Stratiomydae that it seems worthwhile to record this fragmentary observation.

Members of the genus Hermetia appear to thrive best in decaying vegetation, preying upon other insects that live there. A favorite breeding place for several species is the basal part of the dead stalk of yuccas and agavas.



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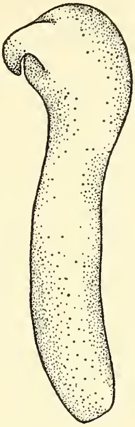

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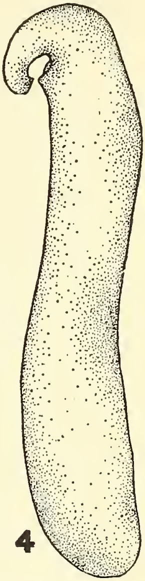

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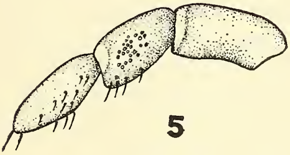

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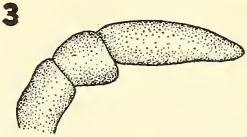

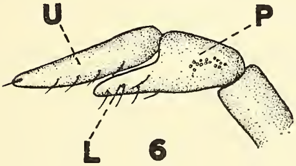

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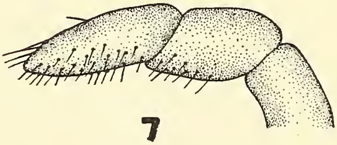

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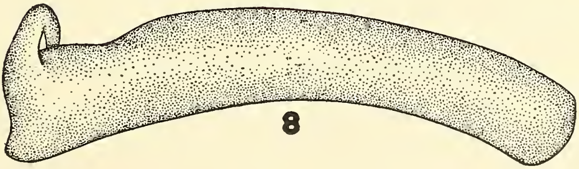

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NOTES ON EGG-LAYING AND MATING HABITS OF MYOPSOCUS NOVAE ZELANDIAE KOLBE

By J. W. Campbell,
New Brighton, Christchurch, New Zealand.

In the introduction to his monograph of the *Copeognatha of New Zealand,* published in Transactions N. Z. I., Vol. 54, pp. 162–197, Dr. Tillyard states that "little is known of the life histories of the Psocoptera. Their eggs are laid in flat masses of twenty or more together on leaves or under bark and are covered with a fine protective web spun from the mouth of the insect in a manner similar to that of the lepidopterous caterpillar." (p. 173).

In his description of the *Myopsocinae,* he states that "they were easily reared by keeping them on pieces of bark in dry tubes closed with cotton wool." In his "Insects of Australia and New Zealand" he briefly refers to the eggs as "flattened and laid in masses generally on leaves or bark—the female covering them over with a silken web."

Dr. Imms in his "General Text Book of Entomology" gives a figure of portion of a leaf with "eggs beneath silken threads" (*Peripsocus phaeopterus*) Fig. 296.

Dr. Comstock, in his "Introduction to Entomology," says the "eggs are laid in heaps on leaves, branches and the bark of trunks of trees. The female covers them with a tissue of threads. It is believed that both sexes have the power of spinning threads. The silk is spun from the labium."

Myopsocus novae-zelandiae.

This insect is common in the vicinity of Christchurch, N. Z., where it breeds freely on the weather-worn and rotting fences surrounding city and suburban properties. The following observations were made on these insects, breeding on the upright and cross pieces of wood framework, supporting a corrugated iron fence. The section is situated within a quarter of a mile from the sea, and the lie of the fence is such as to leave the inner side of the fence in the shade for the greater part of the day. All observations were taken on the shady side where the insects congregated.

Females predominated largely, about a dozen females being easily captured for every male, taken or observed. The greater number were taken from the under side of the cross beams, where groups of a dozen or more would be found sitting or feeding. On being disturbed they rarely fly, but run with surprising speed round the angle of the beam, to hide in the crevice between the wood and iron. Failure to grip the roof-like wings with the forceps would cause the insect to take flight with a quick flip of the wings, but only for a short distance of from two to three feet, giving the flight more of the appearance of a jump to the fresh spot where they settled.

About a dozen females were put in a glass jar on January 28, and to these were added males at intervals up to February 10. Dead specimens were removed on the 14th, 16th and 21st of February, but afterwards no special note was taken of the mortality.

Adults could be captured from the fence till the end of February. Young specimens were collected on January 21 and 29, February 1 and 9, the last lot being taken on March 4, after which the young broods appeared to have retreated well into the crevices of the woodwork. The young broods of first and second instars congregate closely together and can easily be captured by leaving a flat piece of wood along the framework of the fence. On the following day the young specimens would be found adhering to the under surface, for both young and adults appear to have a preference for the under side of the beams and framework.

Mating.

The larger females with their mottled roof-like wings are sluggish, as compared with the smaller males, and give one the suggestion of well-fed miniature rabbits, crouched down to the wood surface. The males are brisk in their movements, stand up on their legs, and when not feeding put in their time running around the females, carrying on a courtship which one can only describe as comical. First a series of quick jerky movements, as a parade around the quiescent female, till he arrives at a position facing his partner (as a rule). Heads come in close contact and the mouthparts of the male can be seen to be apparently licking the face of the female. This performance is terminated suddenly by the male standing on his head and curving his body over the female, wings extended, and opening and closing. In sunlight a surprisingly beautiful effect is produced, the wings glistening with a ruby iridescence probably quite entrancing to the female. The female remains quite irresponsive to the excitement of the male whose body is arched over the female and the spasmodic movements of the male terminalia are quite obvious to the onlooker. All the excitement of the male is merely a prelude to the instant when the female chooses to take the initiative; and till she does so the male, perforce, must continue his acrobatic performances. In the actual mating position the female takes the dominant and upper position, the smaller male being held down by the larger body of the female, aided by the slightly expanded wings.

One pair was watched for fifteen minutes, but unfortunately the writer was called away, so no record of the total period was obtained.

A female disturbed in the mating position moved forward slightly, causing the male to become twisted into a curve, without any attempt at resistance, and this peculiar position was retained for more than twenty minutes.

During the whole period of daylight, the males kept up their acrobatic performance, with unabated zeal, and one surmises that they stood on their heads on an average of two or three times in every five minutes, at the least.

Fig. 1

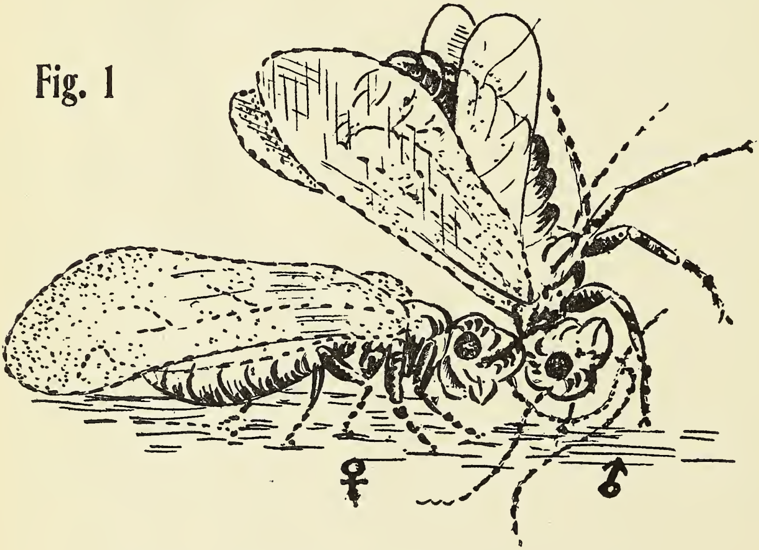

Fig. 1. *Rough sketch illustrating courtship.*

Eggs.

After a few days in captivity with the males, eggs were deposited in small, more or less oval, flattened masses on the pieces of wood in the jar. The smallest mass counted contained 46 to 50 eggs, but the average mass contained from 100 to 200. On the fence beams these masses were deposited on the under surface of a rotting beam placed on top of one of the cross pieces, the eggs therefore receiving shelter from excess moisture and light conditions. No eggs were discovered in the cracks or crevices. Eggs vary in colour from a light sandy grey to a darker colour. The honey-comb appearance is much less distinct in newly laid batches. Egg masses were taken with newly-hatched young that had failed to extricate themselves, after being tangled up in the egg mass debris. The top of each is broken open, but details of the process of emergence were not observed.

In a long series of specimens, ranging from first instar to adult, only four sizes of mandibles could be discovered, giving support to the suggestion by Dr. Tillyard that the instars are four in number.

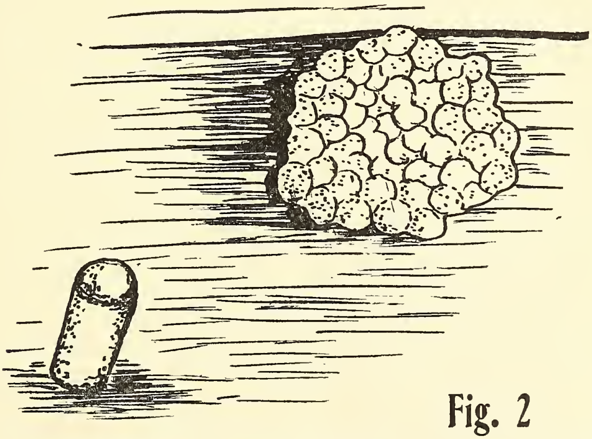

Fig. 2

Fig. 2. *Rough sketch of small batch eggs laid on wood in glass jar, and of a single egg.*

Web.

In no case was any formation of web observed on egg masses and no attempt to cover the eggs by the females in captivity. Absence of web was markedly apparent. In the narrow cracks and crevices occupied by very young specimens, a small amount of threads is apparent, but no evidence was available as to the origin of the threads. The assumption is that this species can, and does, spin a minimum amount, as compared with other species. No web was spun for the covering of the egg batches which were deposited between two adjacent wood surfaces and left entirely free to the limited light and moisture conditions of the fence.

To the writer, a study of the mating position and the details of the male and female genitalia, suggests that the "hooked" terminal appendages mentioned by Dr. Tillyard may possibly be of the nature of cerci with sensory glands and functions, rather than copulatory apparatus, for which both sexes have a specialized set of claspers, etc.

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Transactions N. Z. I., Vol. 54, 1925, pp. 162–197.

Introduction to Entomology, J. H. Comstock, 1924, p. 333.

General Text Book of Entomology, A. D. Imms, 1925, pp. 283–288.

Insects of Australia and New Zealand, R. J. Tillyard, pp. 126–130.

Notonecta reuteri, new name for *Notonecta scutellaris* Reuter 1886.—The name *scutellaris* was proposed for a variety of *Notonecta lutea* Müller. Kirkaldy says in his Revision of the Notonectidae (Trans. Ento. Soc. London, 1897, Part IV, p. 425) that "Dr. Sahlberg has exhibited to the Societas Fennica some interesting varieties of this species (*Notonecta lutea*), one of which he has generously added to my collection. . . ." I have seen this specimen in Kirkaldy's collection. Recently I have received a fine pair of specimens from Dr. Kiritschenko, of Leningrad. The name *scutellaris* was proposed by Fieber in his Rhynchotographieen for his first variety of *Notonecta variabilis* Fieber (1851).—H. B. HUNGERFORD, Lawrence, Kansas.

A NEW KEY FOR BOLTERIA WITH DESCRIPTIONS OF TWO NEW SPECIES (HEMIPTERA, MIRIDAE).*

By Harry H. Knight, Ames, Iowa.

The species of *Bolteria* have been the subect of two previous papers by the writer (Bul. Brook. Ent. Soc., xiv, 1919, pp. 126–128, and vol. xvi, 1921, pp. 73–74). In the present paper two new species are described and a new key provided for the separation of all the known species.

Bolteria nicholi, n. sp.

Distinguished in the key; small ovate form, very distinct in coloration; dark reddish to fuscous, basal edge of pronotum white, apical half of scutellum and more or less along claval suture, pale.

♂. Length 3.7 mm., width 1.8 mm. Head: width 1.2 mm., vertex .61 mm. Rostrum, length 1.6 mm., reaching slightly beyond hind coxae. Antennae: segment I, length .34 mm., greenish yellow, a dark red line beneath which terminates basally in a narrow, paler red annulus; II, 1.52 mm. greenish yellow; III, .55 mm., brownish to fuscous; IV, .47 mm., fuscous. Pronotum: length .78 mm., width at base 1.48 mm.

Dorsum rather thickly clothed with short, sericeous, silvery pubescence and intermixed with fine yellowish simple pubescent hairs. Coloration dark reddish to fuscous and varied with paler areas. Head largely pale, frons with five arcuate red lines each side of median line, basal carina margined with red in front and with black behind; tylus except base, lora, and bordering base of antennae above, black; rostrum dark red to piceous. Pronotal disk with basal edge white, median line usually paler, calli pale and marked with red, anterior margin of disk and a ray behind eye along lateral margin black. Scutellum pale, base black, gradually shading to reddish with irregular flecks of red invading the pale. Base of embolium and corium and more or less along claval suture pale. Cuneus chiefly dark red, narrow outer edge and basal angle white. Membrane fuscous, darker within the areoles, veins white. Ventral surface largely white, sternum blackish beneath, sutures of thorax and narrow base of coxae more or less reddish to black; venter flecked and marked with dark red. Coxae white except base, femora dark red, white beneath, hind pair with anterior face white but with two series of red dots; tibiae pale, tarsi fuscous apically.

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* Contribution from the Department of Zoology and Entomology, Iowa State College, Ames, Iowa.

♀. Length 3.7 mm., width 1.8 mm. Head: width 1.26 mm., vertex .66 mm. Antennae: segment I, length .36 mm.; II, 1.48 mm.; III, .57 mm.; IV, broken. Pronotum: length .80 mm., width at base 1.48 mm. Very similar to the male in coloration and pubescence.

Holotype: ♂, June 18, 1925, Williams, Arizona (A. A. Nichol); author's collection. *Allotype:* same data as the type. *Paratypes*: 10 ♂ ♀, taken with the types on *Pinus edulis* which is doubtless the host plant. ♂ June 15, ♂ ♀ June 22, ♂ June 24, 1925, Williams, Arizona, alt. 7000 ft. (A. A. Nichol). Some of these specimens were taken on *Juniperus* sp. which suggests the possibility of a second host.

Named in honor of the collector, Mr. Andrew A. Nichol, to whom the author is indebted for many new and rare species of Miridae.

Bolteria balli, n. sp.

Allied to *speciosa* Van D., but differs in the smaller size, reddish scutellum, pale cuneus with outer and inner margins only red, while the propleura and epimera of mesothorax are white.

♀. Length 4.6 mm., width 1.8 mm. Head: width 1.43 mm., vertex .68 mm. Rostrum length 2.46 mm., reaching upon first genital segment. Antennae: segment I, length .46 mm.; II, 1.83 mm.; III, broken; uniformly pale. Pronotum: length .83 mm., width at base 1.46 mm.

Coloration above and below rather uniformly light red, sternum scarcely darker; scutellum and frons with fine, pale, reticulate markings; vertex somewhat paler just in front of the carina; cuneus pale, more broadly so than in *speciosa,* narrow margins only red; propleura, epimeron of mesothorax, and legs including coxae, pale to white. Membrane fuscous, somewhat darker within the cells, veins reddish.

Holotype: ♀ June 23, 1913, Kanab, Utah (E. D. Ball); author's collection. Named in honor of the collector, Dr. E. D. Ball, to whom the writer is indebted for the specimen.

KEY TO THE SPECIES OF BOLTERIA.

1. Antennal segment I not equal to width of vertex..........2
   Antennal segment I, in length, greater than width of vertex *semipicta* Blat.
2. Frons pale, transversely marked with red lines............3
   Frons without distinct transverse lines....................5
3. Corium largely pale, with an arcuate dark stripe following the radial vein, thus dividing the pale......................4
   Corium rather uniformly dark red to fuscous, more or less pale at base and narrowly along claval suture; pronotum reddish to fuscous brown, disk and calli flecked with red; femora dark red, hind pair white on anterior aspect and with two rows of red spots; small ovate form, length 3.7 mm. **nicholi** n. sp.
4. Clavus with a pale stripe running lengthwise through middle; pronotum with blackish spot or ray beginning at outer margin of callus and curving around behind toward middle of disk....................................*amicta* Uhl.
   Clavus dark reddish to black, narrow margin bordering claval suture only, pale; pronotal disk white, without blackish ray extending around behind calli, although basal margin of disk is black .... *rubropallida* Kngt.
5. Head, pronotum and hemelytra largely bright red..........6
   Head and pronotum pale yellowish brown; hemelytra testaceous, clavus and apical area of the corium darkened with fuscous .... *luteifrons* Kngt.
6. Scutellum white, propleura red like the disk, epimera dark red to fuscous like the sternum; clavus blackish bordering the scutellum............................*speciosa* Van D.
   Scutellum red, although finely reticulate irrorate with paler; propleura and epimera of mesothorax white; clavus uniformly reddish like the corium................**balli** n. sp.

The key includes *semipicta* Blatchley, a species described from Florida which the writer has not seen. The relatively narrow vertex which in width does not equal the length of the first antennal segment, strongly suggests that this species may not belong in the genus *Bolteria.*

Some time ago the writer indicated[1] that *rubropallida* Kngt. is a synonym of *amicta* Uhler. In working over the species of

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[1] Bul. Brook. Ent. Soc., 1921, xvi, p. 73.

Bolteria to prepare the key here included, I discovered that two distinct color patterns are presented by the types of *rubropallida* Kngt. and specimens of *amicta* Uhler, although among the paratypes of *rubropallida* I find two specimens which are identical with *amicta.* Because of the manner in which these forms differ the writer is inclined to believe that *rubropallida* may represent something more than a mere color form of *amicta.* In *rubropallida* the pronotal disk remains white, while the clavus is uniformly blackish; in *amicta* the clavus is largely white, yet the pronotum has more black than *rubropallida.* Such is not the manner in which color forms of a single species are known to vary. If *rubropallida* is merely a color form of *amicta* showing a black clavus, then the pronotum should likewise be as dark as, if not darker, than in *amicta.*

The genus *Bolteria* is peculiar in the paucity of structural characters for separating the species, although with the possible exception of *rubropallida* we are dealing with species that are very evidently distinct; yet it is difficult to key them except by the aid of color characters. Perhaps species may even appear so similar as *amicta* and *rubropallida* and still be biologically distinct,—who knows? With more collecting of large series of specimens and careful observance of host relationships, we may be able to settle this as well as other interesting problems. It may be worth adding that I have before me for study, six specimens taken June 18 to June 24, 1925, Williams, Arizona (A. A. Nichol), all of which are typical *amicta* Uhler.

Note on Plea.—Nearly all of the *Plea striola* Fieber specimens I have examined from the United States have the flight wings reduced to mere pads. Furthermore, I have seen no direct evidence that they fly. However, I have a specimen taken by H. L. Dozier, Rio Piedras, P. R., Nov. 2, 1924, at light. Most of my South American specimens have been taken at lights.—H. B. HUNGERFORD, Lawrence, Kans.

NOTES ON THE COLEOPTERA OF 1925

By C. A. Frost, Framingham, Mass.

Stenostomus viduus Dej. It was a great pleasure to take my first specimen of this huge insect at Cornwall, Conn., on the evening of July 10. It was a muggy and relatively warm evening and thunder had been rumbling behind the forested hills in the direction of the Housatonic River. My friend, Mr. K. F. Chamberlain, and myself had spent an hour or two watching a sheet hanging between two willow stubs on the bank of a trout stream which sends its beautifully clear and pure water winding among the hills to the river. We had illuminated the sheet by a gasolene lantern of excellent power, but it failed to attract any Coleoptera of interest. At the conclusion of our experiments we were joined by Mr. Crosby, who had been fishing for eels by the light of an ordinary lantern, and all proceeded to the highway, which is a well-travelled automobile road considerably higher than the stream. It is bordered by large pines, hemlocks, elms and other trees and the wooded hill rises sharply along its southern edge. As we were passing a spring-fed brook which runs beneath the road to the stream, K. F. let out an unearthly yell and leaped forward so suddenly that I wondered why his rubber boots were not left standing alone in the middle of the road. Before he landed I had just time to see a black sprawling thing moving across the smooth travelled way. Combined with the grotesque shadow cast by the swaying lantern it appeared larger than a mouse. It was a male *S. viduus* with the elytra not fully hardened. I had not taken three steps when I saw a female lying quiet in the dirt near the side of the road. It had then begun to rain lightly and continued by intermittent showers for an hour or more. The time was in the neighborhood of 10 P. M. After continuing up the road a short distance we decided to follow it in the opposite direction for a mile or two through the more densely wooded portions. Mr. Crosby here left us and promised to "holler" should he find anything resembling another *Stenostomus* while within calling distance. We had covered scarcely a hundred yards when we heard an excited shout, and running back, met C. with a fine male grasped in his handkerchief. He said it was very conspicuous even in the dim rays of his kerosene lantern, as it scurried across the road at full speed. We followed the road back for more than a mile and saw no more specimens and the return trip proved no more productive. On two other evenings we patroled this road and also several other favorable localities in the automobile, hoping to pick up some more *Stenostomus* by the aid of the headlights. We saw nothing but a *Carabus limbatus.*

At the suggestion of our friend, Mr. L. B. Woodruff, of Litchfield, whose genial companionship we shall never enjoy again, we tried sugaring the trees along the roadside, but with very poor luck as it appeared to us at the time. After I had returned home and examined the single specimen of what we thought was a small *Sphaeroderus lecontei* Dej. and which my companions disdained to pick up, I considered the evening well spent; it was a fine example of *S. canadensis* Chd. and new to my collection.

Dicerca tuberculata Cast. A beautiful green male (*D. manca* Lec.) was taken on the trunk of a slightly diseased balsam fir at Paris, Me., June 19. This species resembles *D. chrysea* Melsh., but is greenish in all specimens seen, though coppery ones probably occur. The type of sculpture is much coarser and different and the females have the last abdominal segment ovately rounded with a sharp edge which is somewhat deflexed. The elytral apices are obliquely truncate with the outer angle prominent, while in *chrysea* they are rounded.

Just why *hilaris* Lec. should be called the male and *manca* Lec. the female is not at all clear, since Dr. LeConte states in his description of *hilaris,* " a male found at New York by Mr. H. Ulke; a female found at Brooklyn, New York, given me by Mr. Akhurst." Under *manca* he writes, "one male found at New York by Mr. Ulke." In both descriptions he states that the females have the last segment of abdomen rounded, so it is evievident that he saw both sexes of each species.

Chrysobothris lecontei Leng (*azurea* Lec.). This little beetle appears to be as rare as it is beautiful, and wherever I have met it, whether on the wooded hillsides of Maine or Connecticut, in the Berkshire Hills or the sand plain area of eastern Massachusetts, it has generally appeared as a wary and agile individual. It often frequents piles of hardwood brush in forest clearings where it is almost impossible to capture in a net. At Cornwall, Conn., I spent an hour or more trying to net or otherwise capture one or two specimens of this beetle. They would run along a small branch of the brushwood pile and were generally protected by several intervening twigs and limbs; occasionally one would run up a protruding limb and seemed easy to net, but I failed in this several times. I finally secured one on a pile of cordwood and this may have been the only one in the clearing as I saw no more after that. This was on July 8. I have seen this species on beech brush piles in Maine, on a fallen elm in Conn., and have beaten it from fire-killed oak scrub in Framingham.

Chrysobothris verdigripennis Frost. A single specimen was taken in a hillside clearing at Cornwall, Conn., on July 8. It was spreading and trying its wings on the upper side of a hemlock bough and my position on the side of the steep hill above (combined with a great deal of luck) enabled me to net it by striking directly down upon the bough. No other specimens were seen here though I returned to this place on several successive days. A fine female was taken on the trunk of a balsam fir by a cart road through a pasture, at Minerva, N. Y., on July 20. It was early in the morning and so cool that I was able to pick up this specimen in my fingers as though it had been the *Dicerca* for which I at first mistook it.

Stenocorus (*Toxotus*) *trivittatus* Say. The first and only specimen I have ever taken was at Minerva, N. Y., July 20, on the flowers of a red milkweed in an open pasture.

Strangalia (*Leptura*) *plebeja* Rand. On the same date and in the same pasture, but nearer the foot of Hayes Mt., where the smaller open places had grown up to scattered alders, willows and brambles, and the whole was surrounded on two sides by thickly wooded areas; I took four specimens of this beetle on the flowers of the white Spiraea. One specimen is very nearly black.

Agrilus pusillus Say. My first and only specimen of this small insect was taken at Hoosick, N. Y., on July 15, by sweeping weeds and bushes along a small brook running through a mowing field.

Agrilus viridis fagi Ratz. The occurrence of this introduced species by scores on wild rose bushes in a swamp about a mile from the village of Hopkinton, Mass., was one of the great surprises of my collecting experiences. I took single specimens of this at Southborough, a few miles north, by sweeping in 1923 and 1924. On June 7, in the Hopkinton swamp, I found the rose bushes in from 3 to 6 inches of water and half a dozen specimens of the beetle would be found in the net after each period of sweeping. Between 75 and 100 specimens were taken and probably many more could have been taken on other patches of rose bushes, had it not been for the extremely difficult travelling and the intense heat which was officially recorded as 96° in the shade at Framingham. What the temperature was in that open swamp surrounded by woods, I refuse to estimate.

Psephenus lecontei Lec. Until last year at Cornwall, Conn., I had never taken but three or four specimens of this species, although the larvae were common on the under sides of small stones in the running water of the old "sucker brook" of my boyhood days. At Cornwall I found them chasing each other around the water line on the partly submerged stones where the current was flowing at four or five feet per second. At Pottersville, N. Y., on some rapids of the Schroon River they occurred on boulders in a current of 8 or 10 feet per second. They remained always in the sun and displayed great agility in escaping by slipping onto the water surface and then taking flight an instant later as the water whirled them away. Probably the females were depositing eggs and I noticed in many places water Hemiptera of the Family *Gerridae,* suspiciously interested in searching along the edge of the water on these boulders. At other places a small greenish fly was engaged in the same occupation. I could not find any eggs of the beetle.

Chalepus walshi Cr. This species can be taken quite abundantly by sweeping grass and weeds in low land in this locality. The identity of my specimens was for a long time in doubt, but through the kindness of Mr. W. S. Fisher they were compared with a specimen of *C. walshi* Crotch, which was described from Illinois, in the National Museum. All the eastern specimens are black, with a clear red pronotum, while a Colorado specimen has the elytra blue, thus agreeing with the description of C. *collaris* Say; it is very similar to the eastern black ones in other respects. *C. bicolor* Oliv. is red beneath with a red pronotum, which may have a transverse black spot; the front of the head is also longer and narrower between the eyes and more distinctly and coarsely granulate. *C. notata* Oliv. with body black beneath has the pronotal black spot central and the body stouter and differently sculptured from either of the other two.

NEW MEMBRACIDAE VII.

By Frederic W. Goding, Livermore Falls, Maine.

Family MEMBRACIDAE.

Subfamily Smiliinae.

Genus **Cyrtolobus.**

Subgenus *Atymna.*

Cyrtolobus (*Atymna*) **atromarginata** n. sp.

Pale sordid yellow, veined and clouded with pale fuscous, median carina irregularly piceous with a pale line each side contiguous to it; size large.

Head triangular, twice wider than long, basal margin slightly arcuate, irregularly impressed; ocelli equidistant, even with center of eyes; lateral margins straight from eyes and elevated; clypeus not extended below genae. Pronotum well elevated, front margin vertical from base, sharply rounded at summit, then sloping straight to apex which does not reach tips of tegmina; metopidium broad as high; humerals prominent, auriculate; scar above each eye a transverse carina between; lightly evenly punctate, strongly compressed from front to apex. Tegmina clear hyaline, lightly punctate, bases briefly yellow, opaque, veins yellow; 2 discoidal and 5 apical cells, 3d stylate; wings with 4 apical cells, 2d stylate. Body and legs pale yellow. Long. 8, lat. 3.5, alt. 4 mm. Type female, from Cerro Manglaralto, Guayas, Ecuador (Tate). It differs from *pilosa* Funkh. in larger size, more elevated dorsum vertical front margin, position of ocelli, and piceous median carina.

Genus **Ceresa.**

Ceresa nigra n. sp.

Large, shining black, immaculate, legs orange-yellow. Head uneven, piceous, paler areas at base and margins; base sinuate, eyes large, produced outward, pale ring around bases; ocelli equidistant; clypeus large, hairy, nearly half as long as head. Pronotum shining black, immaculate, obsoletely punctulate but stronger on sides; metopidium curved backward regularly arched from base, highly convex on dorsum, slightly concave at apical third where it abruptly narrowed and slender and straight to tip which is longer than abdomen; seen from front strongly convex between tips of suprahumerals which are rounded, about thrice longer than broad at bases, directed outward, distinctly downward and strongly recurved from bases; sides well impressed above humerals, the usual triangular space behind horns convex, its lateral margins rounded; median carina indicated only by a paler line at base of metopidium, beginning on dorsum above middle curved lateral impressions, sharp; sides flatly compressed, abruptly narrowed and slender at apical third, then straight to tip which is long as abdomen. Tegmina broad, strong, dark yellow hyaline, base clavus and around bases ulnar veins opaque, venation ferruginous; wings with 4 apical cells, 2d cell very briefly stylate in one wing, narrowly but distinctly sessile in the other, 3d cell occupying nearly half apical width. Abdomen piceous, sides, chest and legs sordid testaceous. Long. cum teg. 9, lat. inter corn. 4.5 mm. Type, female, from Guabito, Bocas del Tores, Pan. (C. B. Williams).

Gelastogonia funkhouseri n. sp.

Head yellow, vertical, subtriangular, wide as base pronotum, punctured, base convexly elevated middle emarginate with transverse depression, another depression at base clypeus; eyes large, pediculate, brown; ocelli equidistant, even with center of eyes; lateral margins straight to obtuse apex, clypeus not produced below. Pronotum densely and coarsely punctured; metopidium twice broader than high, transversely impressed above each eye, convex from base; humerals prominent, auricular; crest placed just behind humerals, well elevated, front margin oblique, summit truncate lightly depressed at middle, front angle rounded, angulate behind, hind margin oblique to dorsum then straight to apex; sides with 3 or 4 strong lateral carinæ, median carina sharp on summit of crest. Ferruginous, broad irregular oblique band between humerals passing in front of crest, another from sides of crest to lateral margins, a third from posterior angle of crest to middle lateral margins, pale yellow. Tegmina long as pronotum, with basal two-thirds of free part ferruginous, opaque, densely punctured, apical third clear hyaline, interior half smoky hyaline, veins piceous; corium with 1 discoidal and 5 apical cells. Wings with 4 apical cells, 2d stylate. Body and legs pale yellow.

In outline it resembles the figure of *pulchella* of Dr. Funkhouser in Canadian Entomologist, volume xlvi, plate 24, figure 7, differing from it in the oblique hind margin and angle at base of the dorsal crest.

Type, ♂, long. 8 mm.; lat. 4 mm.; alt. 4 mm. Hab.: Huigra, Ecuador (Williams).

Dedicated to Dr. W. D. Funkhouser, who has done so much to invite attention to this strange group.

Genus **Phormophora.**

Phormophora luteostriga n. sp.

Head triangular, twice broader than long, basal and lateral margins sinuate; clypeus quadrangular, produced below genae, apex truncate; ocelli distinctly nearer to each other than to eyes. Pronotum black or piceous, an indistinct dark ferruginous transverse cloud between humerals, dorsal sulcus front of middle, lateral margins front of humerals, and small spot on prostethium just behind each eye, bright yellow. Tegmina vitreous, basal two-thirds of free part piceous, opaque, punctured. Abdomen weak yellow, apex piceous; legs black, middle segment hind tarsi yellowish. Long. 5.5, lat. 2 mm. Type female, and 5 paratypes from Tena, Ecuador (Williams).

Genus **Micrutalis.**

Micrutalis zeteki n. sp.

Head shining black, smooth, not punctate, base almost straight, twice wider than long, apical margin rounded from eyes and narrowly testaceous; eyes large, white; ocelli white, slightly nearer to and on level with superior margin of eyes. Pronotum shining black, minutely punctulate on sides; humerals acute, not prominent; posterior process black, tip white, long as abdomen piceous; legs piceous, tips front and middle tibiae testaceous, tarsi fusco-testaceous, hind legs dull black. Long. 2, lat. 1 mm. Type female, from Panama, Pan. (Zetek).

Pupa piceous, dorsum elevated, tridentate; wing pads double longer than broad, rectangular; apex curved directly upward its tip and legs testaceous.

This is the smallest species seen, somewhat resembling fig. 1, pl. 8, B. C. Am. Hom. ii., but one-half as large, and no hyaline spots on tegmina.

Subfamily TRAGOPINAE.

Genus **Ceratopola.**

Ceratopola sodalis n. sp.

Triangular, body black, slightly shining, with yellow stripes. Head almost elliptical, black, punctulate, basal half subopaque, apical half shining, 2 longitudinal stripes from base curving below cornicles to lower ocular angle, margins at eyes, and clypeus yellowish-red, the latter with 2 oblique brown lines. Pronotum with narrow stripe each side median carina curving behind humerals in dots not reaching lateral margins, hind margins humerals, stripe each side from middle lateral margins posterior process obliquely forward to middle of sides then united by a transverse band strongly curved backward, sordid yellowish. Tegmina fuscous and punctate on free part, black spot covering apical cells, discoidal cell minute, basal half costa broad; apical margins very broad, wrinkled, sordid white. Body black, middle chest, rostrum, and segmental margins abdomen ferruginous.

Apical margins head angulate below eyes, straight to clypeus which is broad and produced half below genae its apex truncate; base with tubercules shorter than broad at bases; ocelli nearer to and slightly above center of eyes; eyes large together with head slightly broader than base pronotum. Pronotum one-fourth longer than broad between humerals, base horizontally strongly produced forward and flat, margin rounded between but not covering eyes; a strong percurrent median carina; humerals produced in moderately large triangular horns, front margin flat; metopidium convex from horizontal part to apical third then abruptly and obliquely declivous to apex which is acute and longer than abdomen and tectiform; sides bi-impressed, behind humerals and at middle.

It differs from *corniculata* Stål, the only described member of the genus, in smaller size, tubercular cornicles, horizontal base metopidium, produced humerals, acuminate apex, and color of body. Type female, long. 4, lat. inter hum. 3 mm., from Napo River, Ecuador (Williams).

Genus **Tragopa.**

Tragopa (*Tragopa*) **obesa** n. sp.

Dull black, two yellow bands each side posteriorly. Head missing. Pronotum dull black, punctured, stout, convexly elevated, without median carina or smooth line, covered with short pale hairs, seen from front not prominent, seen from above or behind triangularly produced excavated below, tips depressed; sides parallel, apical margin broadly rounded; 2 straight vertical bands each side from lateral margins behind humerals, parallel, not reaching dorsal line, grayish-yellow, the subapical band formed of contiguous spots somewhat broken; apical margin narrowly pale. Tegmina with free part apical cells, and narrow interior margin piceous; posterior margin very broad wrinkled, sordid white, the interior vitreous; wings vitreous, 4 apical cells, 1st cell minute. Body brown, front and middle legs pale yellow, hind legs dull piceous. Type male, long. 3.5, lat. 2 mm., from Tena, Ecuador (Williams).

Tragopa (*Tragopa*) **zebra** n. sp.

Dull black, very hairy, three transverse pale yellow bands. Head yellow, a U-shaped band from base including ocelli, and tip clypeus, black; ocelli large, elevated, slightly nearer and just above center of eyes, lateral margins straight, basal margin almost straight; clypeus quadrate, extended slightly below genae, tip lightly rounded. Pronotum dull black, punctured, sides parallel, apical third abruptly acuminate, tip acute slightly longer than abdomen; a slight smooth median line; convex; 3 broad bands over dorsum reaching lateral margins where they are narrower—1st broadest its ends touching humeral sinuses and angulate in front, 2d slightly narrower, 3d subapical its ends united with the narrow apical margin, pale dull yellow. Tegmina dull black on free part, apical cells, and interior margin; apical margin very broad, wrinkled, smoky, central part vitreous; wings with 4 apical cells, 1st minute. Body shining black, front and middle legs yellow, hind legs piceous. Type female, long. 3, lat. 2 mm.; one paratype, similar; from Tena, Ecuador (Williams).

Tragopa (*Tropidolomia*) **irrorata** n. sp.

Very dark dull brown reddish-brown, hairy, yellow-irrorate. Head dark reddish-brown, shining, immaculate, base lightly sinuate, clypeus quadrate, broad, tip truncate; about twice wider than long. Pronotum depressed, not elevated, reddish-brown, punctate, rather dull; humerals prominent, not produced; sides parallel, abruptly acuminate at apical third where posterior lateral angles are prominent; slight median smooth line; in the type form there is a broad triangular area beginning some distance from basal margin, its apex reaching middle of dorsum, behind this a narrow transverse band from lateral margins curved each side and sharply angulate posteriorly on dorsum, and apical third, testaceous-irrorate; sometimes anterior area is represented by an oblique stripe from humerals and spot across dorsum, the transverse band broken, or it extends over basal half and head, in the female, the male more depressed, slightly smaller, markings less distinct; in all forms the transverse band is distinct. Tegmina red-brown on free part; apical cells, and inner margin piceous; apical margin very broad, wrinkled, smoky; wings vitreous, 4 apical cells, 1st minute. Body red-brown, front and middle legs sordid testaceous, hind legs brown, all very hairy. Type female, 3.5, lat. 2.5 mm.; 2 female paratypes, and 1 male, from Tena, Ecuador (Williams).

Tragopa (*Tragopa*) **bicolor** n. sp.

Brilliant yellowish-red, very finely punctulate, with black spots. Head red, base nearly straight, twice broader than long; ocelli near and above center of eyes; apical margin broadly rounded between eyes; clypeus broad, tip truncate. Pronotum convexly elevated, no median carina or smooth line, sides nearly parallel, abruptly acuminate at apical third, tip acute; covered with short hairs; a large oval spot from base metopidium to middle dorsum, small spot behind each humeral, and apical third shining black. Tegmina with free part shining black, apical cells and inner margin piceous; apical margin very broad, wrinkled, fuscous spot behind apical cells, otherwise vitreous; wings vitreous, 4 apical cells, the 1st cell minute. Body black, legs yellow sexual segment testaceous. Type female, long. 3.5, lat. 2 mm., and 1 paratype, similar, from Tena, Ecuador (Williams). All types are in my collection.

ANENT BLATCHLEY'S MANUAL OF HETEROPTERA, WITH DESCRIPTION OF A NEW NABID THEREFROM.

(Hemiptera, Nabidae.)

By Halbert M. Harris, Ames, Iowa.

Through the courtesy of Mr. Wm. J. Gerhard and, after extended correspondence, of Professor W. S. Blatchley, the writer has been privileged to examine some of the specimens of Nabidae that were before the latter when he was preparing his latest Manual. From a study of these specimens, and of those portions of "The Heteroptera of Eastern North America" dealing with them and their related forms, it has become evident that there are certain errors in the Manual that have not been called to the attention of its users.

(P. 538). Subfamily CARTHASINAE subfam. nov. If Professor Blatchley was right in transferring the genus *Carthasis* Champion from the Nabidae to the Reduviidae he likewise was right in erecting a new subfamily therefor. However, it is my opinion that *Carthasis* is a true nabid and not a reduviid genus. The beak is as surely 4-jointed as it is in any *Nabis.* The interocular groove is more or less distinct in all nabids and in some even more so than in *Carthasis.* The lack of ocelli is not a character for consideration. Ocelli are always lacking in some nabid genera (*Pachynomus* Klug and *Neogorpis* Barber), and even in some species of the genus *Nabis.* The form of the body of *Carthasis* (anterior coxae and front acetabula included) is essentially the same as in the nabid genera *Neogorpis* Barber, *Gorpis* Stål, and *Veronia* B. White, and in fact is the main character of the tribe *Gorpini* Reuter of the subfamily Nabinae. On the other hand there is in *Carthasis* no indication of a "stridulatory" groove on the prosternum for the reception of the beak and, what is more convincing, the genitalia of male and female are distinctly nabid-like in character. The uni-articulate tarsi, while characteristic of *Carthasis,* is no more an occasion for the transference of the genus to the Reduviidae than it would be for transferring it to the Ploiariidae or to any of the other numerous families where species with one-jointed tarsi occur, or, vice-versa, for the transference of these other forms to the Nabidae. From Professor Blatchley's characterization of his subfamily Carthasinae (slender, with transverse groove between eyes, ocelli absent, beak 3-jointed, long front coxae, and 1-jointed tarsi) it would seem that he should have placed it in the Ploiariidae and in fact that is where *Carthasis* runs to in his key on page 501 (if we consider, as he does, that the beak is 3-jointed).

(P. 588, line 8). The writer apparently overlooked several species, for there assuredly are more than "21 species" in America north of Mexico. He treats of 20 in his book.

(P. 589, line 4). The author has overlooked one of the three genera that occur in this country.

(P. 591. NABIS, line 17). 23 rather than " 19 " species were recorded from this country at that time.

(P. 594). *Nabis crassipes* Reuter. Specimens that Blatchley had before him (from Alabama and Florida) have proved upon examination to be identical with others that he describes in his next paragraph as *N. nigriventris* Stal. The specimen that he lists as *crassipes* from Tepehuanes, Mexico, is very different from the others and in fact represents a most distinct new species belonging to a different subgenus from that to which *crassipes* belongs. It is described on a following page of this journal. Inasmuch then as Professor Blatchley has very evidently confused more than one species in his characterization of *crassipes* it is not surprising that he has erred in his attempt to make a note of correction in regard to Champion's figure of this form. Specimens of the true *crassipes* before me have the tibiae annulate just as Champion has figured them.

(P. 594). *Nabis nigriventris* Stal. Two of the specimens listed in the manual (from Dunedin, Florida) have been examined. They represent males of what the author listed on his preceding page as *N. crassipes.* Whether they are the true *nigriventuris* of Stål remains yet to be seen. It is worthy of note that there is at hand, as pointed out below, still another specimen of this form that bears the label, *Nabis sordidus* Reut., W. S. B. determination.

(P. 595). *Nabis sordidus* Reuter. A specimen from Arkansas, labelled as having been determined as this species by W. S. B., is identical with what W. S. B. has previously called *crassipes* and *nigriventris.*

(P. 596). *Nabis constrictus* Champion. The statement that this form was "not before recorded from this country" is in error.

It was recorded from Washington, D. C., ten years before the appearance of "The Heteroptera" and it is not uncommon in collections. It may also be well to point out here that Professor Blatchley has perpetuated Champion's error in placing this species, and the related *N. spinicrus* Reuter, in the subgenus *Hoplistoscelis* Reuter, as is evidenced by the grouping in his key on pages 591 and 592 of "The Heteroptera." As a matter of fact, however, the femora are armed not as in *sordidus, nigriventris,* and *crassipes,* but exactly as in *N. annulatus* and of course the species would run to that couplet in the key. Furthermore the "short black spines" should perhaps be described in the former three species as "short blunt teeth" (characteristic of subgenus *Hoplistoscelis*). *N. constrictus, N. annulatus* and *N. spinicrus* lack these teeth on the anterior and intermediate femora. These latter species belong to the subgenus *Lasiomerus* Reuter.

(P. 598). *Nabis propinquus* Reuter. "The long-winged form, *N. vicarius* Reut. (1873, 87) is said to be very rare." By this statement the author of the manual seems to imply that the macropterous examples of *propinquus* should be called *N. vicarius* or more likely that *N. vicarius* was described from the long-winged form. However, *vicarius* was described from the brachypterous and there seems to be no reason for the implication.

(P. 600). *Nabis flavomarginatus* Scholtz. The form described is *N. vanduzeei* Kirkaldy, a distinct species definitely known only from Colorado. Perhaps it should not be included in a manual of Eastern forms. The statement, "The typical long-winged *flavomarginatus* is palaearctic," etc., seems to imply that *N. vanduzeei* occurs only in the brachypterous form, and *flavomarginatus* only in the macropterous, which is of course not true and which probably was not meant to be implied.

(P. 580). *Nabis kalmii* Reuter. Three of Blatchley's specimens, two from Marion County, Indiana, and one from Putnam County, Indiana, have been examined. All are *N. ferus* Linn., and in neither of the three is the " First joint of antennae distinctly shorter than head in front of ocelli" as the author of the manual describes them. When the writer returned these specimens with the statement that they were *N. ferus,* Professor Blatchley wrote that they were determined as *kalmii* for him by Mr. ————. However, there appears to be no record in the manual to ascribe the determination to anybody but Mr. Blatchley.

Nabis gerhardi n. sp.

Body short, broad, opaque, pilose; testaceous, marked with fuscous to black. Head with the tylus, a broad stripe on the vertex (widened anteriorly), and the sides behind the eyes brownish fuscous; its under surface black. Pronotum with anterior lobe and the sides in greater part brown, the cicatrices and a median line fuscous; the posterior lobe with humeri and five obsolete lines on the disc brown. Scutellum black with a yellowish callosity on either side. Hemelytra obsoletely mottled or speckled with brown, darker apically. Connexivum pale testaceous, the basal halves of the segments dark brown into fuscous. Meso- and metasternum dull black. Venter brown, paler distally. Antennae, rostrum, and legs brownish testaceous, the latter spotted with brown.

Head short, broader than long, slightly obliquely narrowed behind the eyes. Eyes moderately large, the length of one distinctly less than width of vertex. Ocelli raised, very prominent. Antennae short, segment I less than half the width of head through eyes (16:33); proportion of segments, 16:28:25:24. Rostrum with segments II and III subequal, each slightly longer than I of antennae (21:16). Pronotum broader than long (62:50). Hemelytra moderately thickly clothed with short, semi-erect brownish hairs; membrane hyaline, extending beyond apex of abdomen. Legs short, rather thickly pilose; the anterior femora incrassate, only about three times as long (measured beneath) as deep. Intermediate femora armed beneath with numerous short piceous spinules. Venter thickly clothed with fine, silvery hairs. Genital segment short; the clasper with a broad semi-circular blade. Length, 5.8 mm.; width, 1.85 mm. (at abdomen, 2.25 mm.).

Holotype, macropterous male, Tepehuanes, Mexico, 1909, H. F. Wickham, collector, in author's collection. This distinct little species is the most robust of our members of the genus, and is readily separated from all others by the short antennae, maculate connexivum, and robust form. The tibiae are faintly dotted with brown, the anterior pair being rather distinctly curved inward. The holotype is the specimen listed by Professor Blatchley (Heteroptera of Eastern North America, p. 594) as *Nabis crassipes* Reuter. The femora, however, lack the armature characteristic of *N. crassipes* and its more closely related species. It is the writer's pleasure to name the species in honor of Mr. Wm. J. Gerhard, who so kindly sent it to him for study.

A NEW ACTINOTHRIPS (THYSANOPTERA) FROM BRAZIL

By J. Douglas Hood, University of Rochester.

Actinothrips bondari sp. nov. (Fig. 1, *a* and *b*.)

Female (*macropterous*).—Length about 5.1 mm. Color nearly black, especially the abdomen, head and thorax paler and brownish; antennæ with segments 1 and 2 concolorous with head; 3–5 yellow, with increasing amounts of blackish brown at apex, 3 brownish basally; 6 yellowish brown, blackish brown apically, paler in pedicel; 7 and 8 blackish brown; legs concolorous with body; wings lightly brownish at base, both pairs with a strong, nearly black vein extending from near base almost to apex.

Head nearly 2.3 times as long as width across eyes and about 3.1 times as long as median length of pronotum, produced in front of eyes, the sides of this produced portion straight, parallel, and longer than diameter of ocellus; cheeks narrowed shortly behind eyes and again at base, each with two very strong, stout bristles, one at basal third, the other close behind eyes; surface closely and lightly transversely striate; postocular bristles longer than eyes, their tips about attaining front margins of eyes, their bases farther from sides of head than from each other; postocellar bristles usually a little longer than diameter of ocelli. Eyes about 0.27 as long as head and 1.8 times as long as width, which is a little greater than the interval. Ocelli of posterior pair with centers opposite a line which would mark off anterior third of eyes. Antennæ long and slender, 2.8 times the length of head; sense cones long and slender, nearly indistinguishable from the bristles. Mouth cone reaching beyond middle of prosternum, semi-circularly rounded at tip.

Prothorax smooth, with a short longitudinal apodeme in front of middle; anterior and posterior margins strongly arcuate and concentric; anterior marginal bristles minute, pointed, no larger than postocellars, subequal to an approximate pair near posterior margin of notum; the two pairs at posterior angles long, brown, distinctly expanded apically, subequal to postoculars and to each other, the outer one arising from a distinct tubercle; midlateral and antero-lateral two thirds as long, dilated apically, their bases almost touching, the antero-lateral having migrated posteriorly; coxa without strong bristle. Fore femur with three strong bristles on outer surface, the distal one much smaller than the others (which have blunt, slightly dilated, pale tips), the middle one nearly as long as postoculars and more dorsal in position; inner surface with two strong bristles, more or less alternating with those on outer surface, the distal one longer and stronger; all of these bristles arise from broad, low tubercles; *no strong bristle on dorsum of femur near apex;* fore tibia with two moderately long but slender bristles near base; fore tarsus unarmed. Mid femur with a circlet of four stout bristles near apex (the femur narrowed distally beyond their bases), and a single longer one near middle of dorsum. Hind femur with the two inner bristles of the subapical circlet longest, and with two longitudinal rows of four strong bristles each in addition, the distal one in the more nearly dorsal row longest. Wings of nearly equal width throughout and with the median vein strong and nearly black in both pairs; fringe long and close, that on fore wings double for about 34 hairs; distal subbasal bristle equal to those on posterior angles of prothorax and dilated apically, middle bristle pointed and half as long, basal bristle intermediate in size, dilated apically. Metascutum with a pair of strong dark bristles longer than postoculars.

Abdomen long and slender, broadest at segment 2 or 3, thence with sides straight and converging to tube; bristles long, slender, pointed, and yellowish or brownish in color; tube nearly twice as long as head, covered except apically with numerous slender, dark bristles, many of them twice as long as greatest width of tube and subequal to terminal hairs.

Measurements of holotype (♀): Length 5.13 mm.; head, length 0.645 mm., length from eyes to frontal costa 0.120 mm., greatest width (across eyes) 0.281 mm., least width (near base) 0.236 mm.; eyes, length 0.173 mm., width 0.095 mm., interval 0.090 mm.; postocular bristles, length 0.198 mm.; prothorax, median length of pronotum 0.207 mm., width across coxae 0.510 mm.; abdomen, greatest width 0.795 mm.; tube, length 1.22 mm., width at base 0.147 mm., at apex 0.078 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)....	120	96	535	342	294	192	108	123
Width (μ).....	81	57	45	45	41	38	30	26

Total length of antenna 1.81 mm.

Male (*macropterous*). Closely similar to female in all ways, and nearly indistinguishable from that sex in non-cleared specimens; fore femora not swollen, fore tarsi not toothed, abdomen only slightly more slender.

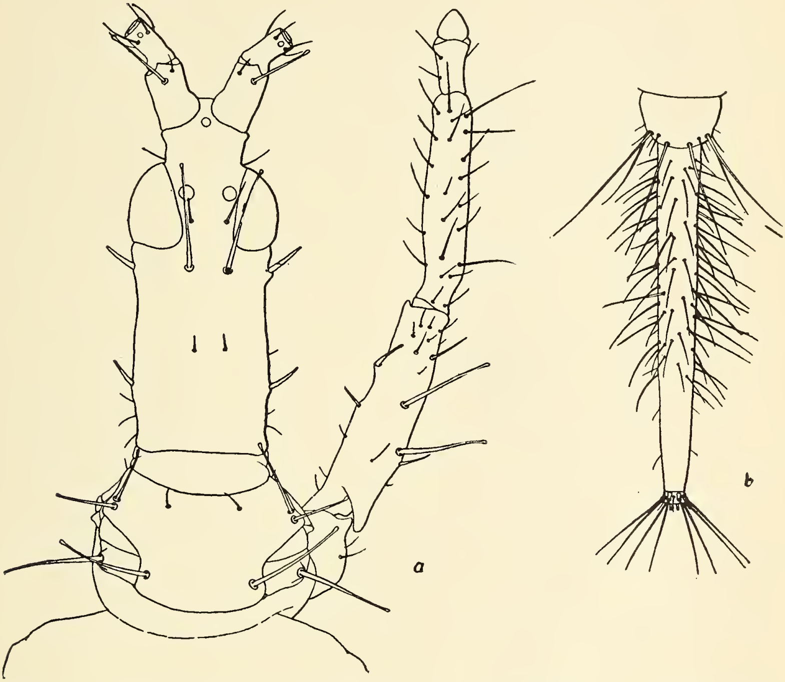

Fig. 1. *Actinothrips bondari* sp. nov., holotype. *a,* head and prothorax (left fore leg omitted). *b,* tube.

Described from two females and one male taken by Gregorio Bondar (after whom the species is named), at Bahia, Brazil, in dead cacao leaves [Bondar No. 375]. Type in the author's collection.

Bagnall's description of *longicornis,*[1] the only other species of the genus, was based upon a single carded specimen and, while it is to be expected that for this reason, if for no other, his description and drawings would differ from the specimens before me, I cannot reconcile my material with his because of several important

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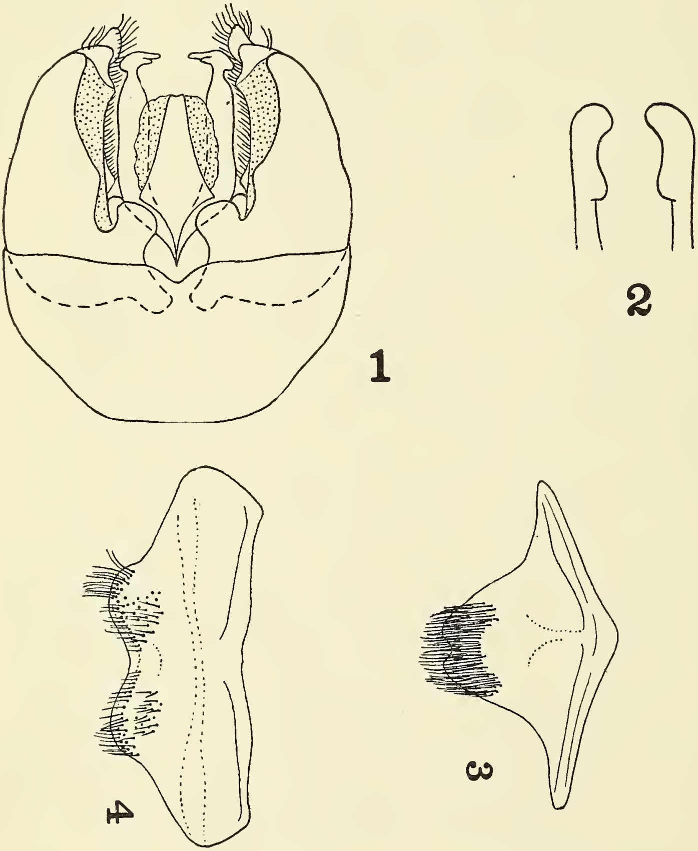
[1] Journ. Linn. Soc., Zool., 30: 333. Fig. 8–12. 1909.

differences: The head of *longicornis* is quite evidently shorter and broader, with shorter and more widely separated postocular bristles; the fore femur of *longicornis* has three, instead of two, strong bristles just before the apex; the prothoracic bristles are shorter in *longicornis,* and those at the anterior angles appear not to be situated close to the midlaterals, but to be greatly reduced in size and normal in position; and, lastly, in *longicornis* the tube bristles are either largely broken off the type or else the species is actually much less closely and lengthily setose in that body segment than is *bondari.*



Figs. 1–4. Structural details of ♂ Genitalia of *Bremus neotropicus* Frison, n. sp.

A NEW SPECIES OF BUMBLEBEE FROM GUATEMALA (BREMIDAE: HYM.)

Theodore H. Frison,
Illinois State Natural History Survey, Urbana, Illinois.

For some time the writer has had in his possession, through the kindness of Professor T. D. A. Cockerell, two males of a species of bumblebee from Guatemala whose specific identity has been a puzzle. A recent study of the male genitalia of nineteen species of Neotropical bumblebees, an examination of the illustrations of the male genitalia of seven other valid species, and an analysis of the descriptions of the remaining described species lead to the conclusion that the males involved represent a new species. Since the bumblebee fauna of Central America is so little known, considerable care was taken, too, to determine whether or not the specimens in question could possibly be the undescribed males of a *Neotropical* species already known in the female caste.

For a time, because of the locality and date of collection of the specimens (identical with data associated with types of *B. wilmattae* Ckll.), I thought that the males here described as new might be the unknown males of *B. wilmattae.* A study of a worker of this latter species which has been compared with the typic worker of *B. wilmattae* indicates, however, that *wilmattae* probably belongs to the Section *Anodontobombus* Krüger, whereas the males here described as new belong to the Section *Boopobombus* Frison.

Bremus neotropicus n. sp.

Male. Face both below and above the articulation of the antennae, occiput and occipital orbits with black or chocolate-brown pubescence. Malar space about one-half as long as its width at articulation with mandible, about one-fifth as long as greatest width of and one-tenth length of compound eye. Compound eyes somewhat swollen in appearance, so that they appear to bulge out from the sides of the head. Ocelli situated just below narrowest part of vertex; lateral ocelli widely separated and removed from the inner margins of the compound eyes by less than their diameter. Flagellum three times as long as scape; third and fifth antennal segment, subequal in length, the fourth much shorter than either.

Pronotum with pale yellowish pubescence; mesonotum with dark or chocolate-brown pubescence, except for a shiny impunctate mesal area; scutellum with pale yellowish pubescence; and pleuron with yellowish pubescence reaching to the base of the legs. Legs with dark or chocolate-brown pubescence.

Dorsal segments of the abdomen with the first and the sides of the fourth with pale yellowish pubescence; remainder of fourth, all of the fifth, and basal and middle portions of sixth, with dark or chocolate-brown pubescence; sides of sixth and seventh with yellowish pubescence. Ventral segments of the abdomen with dark or chocolate-brown pubescence. Hypopygium with a broad *V*-shaped indentation at apex.

Genitalia, heads of sagittae, and inner and outer spathae as shown, respectively, in figures 1, 2, 3 and 4. The prominent inward projecting keel on the mesal margin of the head of each sagitta, together with the shape of the curved head, present a combination of characters which I have not observed in any other Neotropical species.

Wings heavily stained with brown.

Length, 16 mm.; spread of wings, 33 mm.; width of abdomen at second segment, 7 mm.

Holotype.—Male. Guatemala City, Guatemala. Collected by W. P. Cockerell. Deposited by permission in the private collection of the author. One paratypic male, collected at same time and place as the holotype, deposited in the collection of the United States National Museum.

The paratypic male differs from the holotype in having dark or chocolate colored pubescence upon the sides of the thorax, on the scutellum, and on the first and middle portions of the third dorsal abdominal segments. Structurally, however, it is identical with the holotype and must be considered as somewhat transitional to a melanic variety of it. Though I have never had an opportunity of studying the genitalia of a male of *B. diligens* (F. Smith), I am inclined to believe that the new species described in this paper is closely related to this species.

PTOCHIOMERA SAY OR PLOCIOMERA STÅL?

By H. G. Barber, Roselle, N. J.

There would be little point in discussing the above question were it not for the fact that European Hemipterists generally, employ Amyot et Serville's or Stål's emendation of Say's spelling of this generic name. Thomas Say in 1832, Heteroptera of New Harmony, p. 18, erected *Ptochiomera* as a subgenus of his *Pamera,* describing under it *P. nodosa,* thus validating the name. In the "Complete Writings" of Say, Le Conte Ed., Vol. 1, 1859, p. 335, this is printed as *Ptochiomera* [*Plochiomera*]. An explanation for the insertion of the name in brackets is found on page vi in the preface, in the following words: "Typographical errors in the original memoirs have been corrected; *other errors have not been changed, or if noted, the corrections have been placed in brackets.*" (Italics are the author's.) Previous to this Amyot et Serville (1843) changed the original spelling to *Plociomerus* Say, however applying it to a species pertaining to *Pamera* Say. Stål (1874) further emended the name to *PIociomera,* which form has been followed by Distant, Lethierry et Severin, Oshanin, Bergroth and other European Hemipterists. In reference to the use of this form of the name Dr. Bergroth, Rev. Russ. d'Entom. XVII, 1917, 102, makes this important statement: "Some American authors call this genus *Ptochiomera.* I have seen Say's original pamphlet where this name is introduced; it is printed in very small type on coarse paper and it is difficult to decide whether the name is *Ptochiomera* or *Plochiomera.* At any rate these names are without a sense and *Plociomera* is evidently what Say intended to write." On the other hand Prof. Uhler, who must also have seen Say's original pamphlet, states: "The names *Ploxiomerus* and *Plociomera* are later inventions of authors and are not to be found in the writings of Mr. Say. That used above [*Ptochiomera*] is the spelling given by Mr. Say and there seems to be no satisfactory reason for changing it." Proc. Zool. Soc. London V, 1894, 187. It is hardly necessary to point out the confusion and instability which arises when an original generic name is altered to correct a supposed error or to make sense. There seems no justification for a correction or change of name as under the Code of Nomenclature generic names may be formed by any arbitrary combination of letters, although it must be admitted that it was not the custom in Say's time.

EDITORIAL.

ON CACTUS HEDGES.

Not long ago, in an article in this journal, appeared the minatory expression "hog-tight and bull-proof fence," with reference to what the maker of the expression deemed to be the thoroughgoing monopolies of certain groups of insects by certain persons; which monopolies exclude all other students or would-be students, particularly the non-professional, from any participation or right to participate in the study of the monopolized groups.

In Annals of the Entomological Society of America for December, 1927, another author, whose remarks before the convocation meetings appear therein, said practically that none but college graduates in entomology should be allowed to practice that science.

What difference is here is only in the form of the statement, not in the thing itself. And such pronouncements as the second go to justify the idea so roughly expressed in the first paragraph as quoted. It is the professional idea run mad. Suppose none but graduate entomologists had been permitted to work in the science, where would Prof. Comstock be now? In fact, what would be the abysmal status of American entomology today?

A clean-cut inference may be drawn from the basic idea that underlies the plea for the professionalization of entomology; and that inference is that any Ph.D. or Sc.D. from Professor Comstock's hands, however negligible may be his final accomplishment, is much better than his teacher, for the doctor is a college-trained entomologist, and above all things, a Ph.D.! Q. E. D.

Doubtless, it would be a splendid thought to license all entomologists, even as plumbers and horseshoers; such licenses to be issued by a well-paid board of examiners, of course; and every such licensee warranted not to work non-union hours, nor in non-union ways on non-union subjects.

On what meat do these our Caesars feed, that they do grow so great!

Entomology would come to a pretty pass indeed—as would many other branches of biology—if the professionals combined in any such preposterous way to abolish the non-professionals. What entomology needs is more professors that have worked their way up from amateurdom, not fossilized and sacrosanct Ph.D.s.

Speaking personally and representing nobody but myself, I am all for using the bowstring, sack and conveniently placed Bosporus on many people--naming no one definite nameable individual, but a class. I am against incompetency—it annoys me frightfully. It is surely keenly to be regretted, but even Ph.D.s lapse at times, sometimes without pauses between lapses. I judge from what I read that the aegis of a Ph.D. is no protection from the rude, not to say sanguinary, assaults of the bearer of one Ph.D. on another anointed one. So, I ask, why should the amateur be estopped from joining in the pleasant sport, if he is able?

In all seriousness the graduate, as well as the non-professional, stands or falls by one single test—Is he able? The only real distinction between them is that the educated man has at his command far more ways of making an utter ass of himself than the unlettered. And he that rises by his own effort has acquired more stamina and grit than the spoon-fed graduate who is told what the other must learn for himself by sheer toil and in grievous dolors.

The remedy for the uncooked condition of much published matter lies largely in the hands of the entomological editors, who must adopt less of a "You tickle me and I'll tickle you" policy.

And finally, dearly beloved, Peccavi! But I promise amendment.

J. R. T. B.

APOLOGIA.

The great delay of this number is due to circumstances beyond editorial control. Now, however, normalcy is once more with us; and our regular schedule will rule.

J. R. T. B.

EXCHANGES.

This one page is intended only for wants and exchanges, not for advertisements of articles for sale. Notices not exceeding THREE lines free to subscribers. Over lines charged for at 15 cents per line per insertion.

Old notices will be discontinued as space for new ones is needed.

WE WISH to procure in exchange or on cash: *Parnassius of North-America,* with his varieties and aberrations, well labelled, spread or in papers (clodius, smitheus, eversmanni). Dr. Staudinger & A. Bang-Haas, Dresden-Blasewitz.

THE MUSEUM of the Brooklyn Institute has a few uncolored sets of the Calverly, Weidenmeyer and Edwards plates of North American Sphingidae for exchange or for sale at $5 per set. Address, Librarian, Brooklyn Museum, Eastern Parkway, Brooklyn, N. Y.

LEPIDOPTERA from the Mountains of Kentucky. Papilios and other var. of this section collected. Paper spec. of *Xylophanes tersa* and *Catopsilia eubule* on hand. Also Cocoons of the larger Saturnid moths. Ellis Chandlee, Barbourville, Ky.

BUTTERFLY COLLECTORS.—Have you aberrations or freak butterfly specimens for sale or exchange? Professional and private collectors please write. Jeane Gunder, Pasadena, Calif.

CYNIPIDAE.—Galls and bred wasps wanted to determine or in exchange. Alfred C. Kinsey, Indiana University, Bloomington, Indiana.

WANTED.—Am studying the bionomics of the corn billbugs and desire the privilege of examining *Calendra* (*Sphenophorus*) from all parts of the world. A. F. Satterthwait, U. S. Entomological Laboratory, Webster Grove, Mo.

DIURNAL LEPIDOPTERA.—Have many desirable western species to exchange, including *Argynnis atossa, macaria, mormonia, malcolmi, nokomis; Melitaea neumoegeni; Lycaena speciosa;* etc. Send lists. Dr. John A. Comstock, Southwest Museum, 4699 Marmion Way, Los Angeles, Calif.

WANTED.—Ants from all portions of the United States for determination or exchange. Will also exchange other insects for ants. M. R. Smith, Assistant Entomologist, State Plant Board, A. and M. College, Miss.

CATOPINI: *Catops* (*Choleva*), *Prionochaeta, Ptomaphagus.* —Wanted to borrow all possible specimens of these genera from North America for a revisional study. Correspondence solicited. —Melville H. Hatch, Dept. of Zoology, Univ. of Wash., Seattle, Wash.

COLEOPTERA wanted.—Will collect insects of any order in exchange for Silphidae, Scarabaeidae and Cerambycidae. P. Schiffer, 20 First Avenue, New York City.

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OF THE

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Vol. XXIII October, 1928 No. 4

INSECT EXPLOITERS OF ANIMAL SECRETIONS. A CHAPTER OF INSECT BEHAVIOUR.

By J. G. Myers, Farnham Royal, Bucks, England.

That remarkable and widespread ethological phenomenon exhibited in the relations between nectar-secreting plants and their insect-guests—relations often specific, nearly always advantageous to the insect and frequently so also to the plant—has received extended and well-merited study. A constant feature of the relationship is its intimacy. The fact that the nectar or the pollen must be collected at its very source leads in many cases to extraordinary structural adaptations on the part of both host and insect, in the former thus restricting the sweets largely to certain favoured visitors, and in the latter accompanied by specialized feeding-habits.

The parallel exploitation of animal secretions by insects is much more limited and save in a few special cases, has received but little attention. It is, however, a phenomenon of widespread if local occurrence. The insects thus engaged form a small part of Handlirsch's *zoosuccivorous* category—a clumsy and hybrid term we shall not find it necessary to employ. Among these insects we would include all those which feed upon matters exuding from the surfaces or orifices of living animal bodies. We thus exclude, for the purpose of this review, the vast hordes of necrophilous and coprophagous forms, but include those which feed *ab ano,* whether on faecal matter, on true excretory products, or on anal gland secretions—a fact it is often impossible for the field naturalist to ascertain. Thus Forel notes that "there is nothing to prove that what seems to us to be the excrement of aphids and coccids may not be, to a large extent at any rate, a secretion from the intestinal glands by metabolism."

This *honey-dew* or liquid discharge from Homopterous insects is the most important secretion we shall consider. It is sprayed in quantities on the leaves of plants and licked therefrom by hosts of flies, wasps and other insects which never enter into any more intimate relations with the source of supply, and which will therefore be no further discussed here. There is, however, a definite series leading from such examples to specialized cases in which the honey-dew is yielded only on solicitation by judicious tickling, and the Homoptera in question become veritable cows, are tended and even reared by ants. This is the form of symbiosis called by Wasmann *trophobiosis,* and by Forel *synctenobiosis.* Still more complex relations subsist between certain social insects, their young and their guests—a nutritive exchange which Wheeler has described as *trophallaxis.* Trophobiosis and trophallaxis have been so fully studied by myrmecologists that we need only briefly refer to them here.

In the case of flowers and insects, the adaptations (if in spite of von Uexküll we may use the term) are almost necessarily chiefly structural; in the exploitation of animal secretions by insects they are on both sides essentially behaviouristic. To the contrast thus baldly and dogmatically stated there are obvious exceptions. Thus in the first place the crepuscular opening and scent-diffusion of certain flowers which are pollinated by moths is distinctly a modification in plant behaviour. In the second place, increasing dependence upon animal secretions may lead to obligate parasitism and thus to the morphological modifications therein usually involved. Structural adaptation in the animal producing the secretion is rare, but reaches a high development in the glands, trichomes (tufts of yellow hairs diffusing secretions) and exudatoria of many myrmecophilous and termitophilous insects.

It has become trite to point out the numerous cases in which physical and chemical inventions have been anticipated by animal artisans. Here is a biological invention—the domestication of other animals—"discovered" by a number of different insect species. The utilization of animal secretions demands in many cases distinct co-operation, and may lead, as we have seen, to very intimate forms of symbiosis, or to parasitism.

The following brief and probably very incomplete survey is intended to indicate the widespread if uncommon occurrence of the phenomenon, and to suggest that renewed observation, especially in the tropics, may bring to light many more cases among both social and non-social insects. Several new examples are here recorded.

Orthoptera: The small myrmecophilous crickets of the genus *Myrmecophila,* and the little cockroaches of the genus *Attaphila,* are included by Wheeler (1910, 1926) among the strigilators of ants. They feed to a large extent on the dirt and secretions which they lick from the bodies of their hosts.

Dermaptera: The insects of the exceedingly aberrant genus *Hemimerus* live as ectoparasites on the African rodent, *Cricetomys.* They are believed to feed upon the epidermal products of the host. Possibly *Arixenia,* the Bornean species (*A. esau*) of which was found in the breast-pouch of a bat, *Cheiromeles torquatus,* feeds similarly.

Isoptera: Trophallaxis perhaps reaches its highest development in the termite colonies, "the members of which may be said to be found together by a circulating medium of glandular secretions, fatty exudates and partly and wholly digested food, just as the cells of the body of a higher animal are bound together as a syntrophic whole by means of the circulating blood." (Wheeler, 1923, p. 260.)

A similar exchange is believed to take place also between the termites and many of their guests—Staphylinid, Scarabaeid and other beetles, Anthomyiid and Tineid larvae—which are furnished with long finger-shaped exudatoria. A still larger percentage of these guests are decidedly physogastric and may exude secretions from less modified portions of the body as do the termites themselves.

Mallophaga: Unlike the Anoplura, the Mallophaga are believed never to suck blood directly, but to feed upon fragments of feathers, other epidermal products and cuticular substances (Imms). They thus form the only insect order whose members all feed solely on secretions and waste-products of other animal body-surfaces. They are, of course, true parasites.

It would seem that all other insects which regularly utilize animal secretions are members of the Holometabola. It is a matter for surprise that no cases have yet come to light among the Heteroptera, the members of which sub-order seem to exploit nearly every other form of liquid refreshment Nature offers.

Coleoptera: The singular insects of the family Platypsyllidae should possibly be included in our survey, though it is still uncertain whether they feed upon cutaneous substances or upon other ectoparasites of their host, the beaver. The same remarks apply to those other parasites of rodents, the Leptinidae (Riley, Rüschkamp).

In Australia several beetles of the common dung-feeding subfamily of Coprinae have become ectoparasites of wallabies (*Macropus*). By means of large hooked claws resembling those of ectoparasitic Diptera they hang on to these hosts in the region of, or even within the cloaca. A species shown to me by Mr. G. F. Hill appeared in all respects, save the claws, a typical *Onthophagus.* For this and for five other species Arrow (1920) erected the genus *Macropocopris.* The best known form is *M. symbioticus.* All the species so far are recorded only from the northern parts of Australia. I was unable to find any on wallabies in northwestern Victoria.

The Staphylinid beetle, *Oxysoma oberthuri,* is an ant-strigilator, thus feeding, at least partially, on the dirt and secretions licked from the bodies of its hosts (Wheeler, 1926, p. 308, after Escherich).

We owe to Wheeler (1921) an engrossing account of certain social Cucujid beetles which live in the petioles of *Tachigalia paniculata* in British Guiana, in company with small mealy-bugs, *Pseudococcus brevipes* Ckll. The beetles, *Coccidotrophus socialis* Schw. & B. and *Eunausibius wheeleri* Schw. & B., both larvae and adults, caress the mealy-bugs with their antennae to solicit secretions. More recently (Wheeler, 1926, p. 17) Mann has observed another beetle, *Coccidotrophus cordiae* Barb., with the same Coccids in another plant, *Cordia alliodora,* in Bolivia.

In his account of those curious Homoptera belonging to the genus *Tettigometra,* which live in the nests of ants, Forel (1928, I, p. 507) writes, "Silvestri also found the larva of a lady-bird beetle, which, instead of eating *Tettigometra* larvae as its fellows eat aphids, sucks their secretion and lives as a myrmecophile . . ." But in Silvestri's account (1903) of the myrmecophilous Coccinellid, *Hyperaspis reppensis,* which lives in those nests which also contain *Tettigometra,* the beetle larvae are said to devour the eggs of the Homopteron. Mr. H. Donisthorpe, to whom the question was referred, kindly informs me that he knows no reference to ladybird beetles or their larvae "milking" the ant-cattle.

DIPTERA: Miller (1925, p. 30) has seen the indigenous New Zealand bluebottle fly, *Calliphora quadrimaculata,* Swed., "feeding on small drops of the sweet secretion as it collects at the opening of the scale sac" of the introduced Australian Eucalyptus Coccid, *Eriococcus coriaceus* Mask. Another observer (R. C. Robinson) is quoted to the effect that the fly may even insert its proboscis into the opening and suck out the insect itself, but this perhaps needs confirmation. It is interesting that *C. quadrimaculata* has never been observed to exploit any indigenous scale-insect in this way. A mass infestation of *Erioccus coriaceus* is an unforgettable sight—the trees rain honey-dew, hordes of flies are attracted and probably then learn gradually to trace the sweet stuff to its source.

Farquharson (1922, p. 442) found in Southern Nigeria a Cecidomypiid, *Farquharsonia rostrata* Coll., competing with ants (*Cremastogaster*) for the secretions of a scale-insect (*Strictococcus*).

Certain Milichiid and other flies in Southern Nigeria and in Java, observed by Farquharson and by Jacobson, follow ants about and feed upon their anal secretion and excrement, which they lick off. Thus the Javan *Prosaetomilichia myrmecophila* de Meij. follows and feeds on *Cremastogaster difformis* Sm. *per anum,* and *P. brevirostris* de Meij. on *Dolichoderus bituberculatus* Mayr (de Meijere, 1909). "Not only do the ants thus supply in this way, these flies with food, but the latter also lick up the honey-dew which is discharged by the larvae of a Homopteron (Membracid) . . . at the tip of the abdomen. These Homoptera were kept by the above-named ants as cows."

Farquharson (1918) mentions two other species of Milichiidae and an Ephydrid, *Rhynchopsilopa* sp., which exhibit this unpleasant habit *vis-à-vis* ants of the genus *Cremastogaster* in S. Nigeria.

I have lately (Sept., Oct. 1926) observed in Essex (England) a Mycetophilid fly of the genus *Sciara* (kindly determined by Mr. F. W. Edwards) "milking" aphids on the leaves of dogwood. The aphis concerned (*Anoecia corni* Fabr., kindly det. by Mr. F. Laing) is a well-known myrmecophilous species, of which the apterous forms are found only in the nests of ants. The winged forms, on the approach of summer, are placed on the dogwood by the ants. As usual in populous aphis colonies, the honey-dew on the upper surfaces of the leaves was in this case eagerly licked up by a host of Diptera and Hymenoptera (Chalcidids and Cynipids). The aphids themselves were confined to the lower surface of the leaves, where they were attended by a small brown ant and a more numerous black midge of the genus *Sciara*. The latter "would go from one aphid to another of the winged adults, inserting its head under the tail end and also dorsally between the closed wings, near the tip of the abdomen. Occasionally an aphis made a sweeping movement with its nearest leg, or swayed jerkily from side to side, but usually it remained quiescent during the midge's visit." I could not be sure that the droplets were actually exuded in response to the touch of the midge. The antennae of the latter were held straight up in the air. The movements of the midge were bustling and its search quite unsystematic, for it often covered the same ground more than once, and sometimes passed over a droplet adhering to an aphid three times before sucking it. The same appearance of feverish haste accompanied the cleaning operations with which the midge concluded its meal, and then in a flash it was gone.

Williams (1928, p. 131) found a small Phorid fly breeding in the cephalothoracic fovea of a large Theraphosid spider in Ecuador. Presumably the food consisted of dirt and secretions which accumulated in this unusual situation.

Various non-biting Muscoid flies have formed the habit of alighting on man and sucking the perspiration, or the secretions from the eyes. Especially noteworthy and irritating in this regard are *Musca vetustissima* Wk. in the Australian bush, and *Sarcophaga milleri* J. & T. in New Zealand. The former concentrates on the eyes, with exasperating persistence, while the latter sucks perspiration on the arms and backs of the hands. *Musca domestica* is, of course, sometimes similarly irritating, while of *M. sorbens* in Samoa, Buxton writes, "They are most persistent and troublesome, and to avoid the annoyance which one of these flies causes, one must kill it; nothing less is effective." To discuss the medical importance of this habit, especially when open sores and ulcers are visited by the flies, is outside the scope of this paper.

Some of these non-biting flies have succeeded in becoming blood-suckers by utilising the punctures made by biting species. These habits have been described in India by Patton and Crass (1913) and in the Philippines by Mitzmain (1913) and the data summarized by Graham-Smith (1914, pp. 209, 335–338). The non-biting flies concerned are chiefly species of *Musca,* which feed also at exuding sores. "Totally unable to penetrate the skin of the host themselves, they rely on other and better equipped flies to do it for them, and feed on the blood and serum which exudes from their bites. . . . On approaching a biting fly in the act of feeding, the *Musca* will endeavour to thrust its proboscis into the wound, and to oust the rightful occupant; often several will beset the same biter, and when they succeed in dislodging it, or when it has completed its meal, will thrust down their proboscides to suck up the blood which exudes from the wound." Knab (1915) has described a North American Leptid, *Symphoromyia pachyceras* Will., of somewhat similar habits.

In a similar fashion a whole host of flies, wasps and beetles crowd at the feeding punctures of cicadas, on the branches of trees, and suck the sap which exudes from the wound. Thus also, according to Thomann (quoted by Forel) two caterpillars of the genus *Psecadia* are carefully tended by ants on *Lithosperum* plants, not for any secretion they supply directly, but for the sap which flows from the bites of these larvae.

LEPIDOPTERA: The larvae of an Oecophorid moth, *Neossiosynoeca scatophaga* Turn., have been described as performing a regular and remarkable rôle in the nests of an Australian parrot, *Psephotus chrysopterygius*. These nests are excavations in large termite mounds. McLennan "found the larvae, or their remains, in every nest examined with one exception, and was struck by the cleanness of the nests, and their freedom from excreta of the young birds. The exception was an old deserted nest, and this differed from the others in being caked with dried excreta. He sat down and watched one nest for some time, and observed the larvae actually devouring the excreta as soon as they were voided, even cleaning the feet and feathers of the young birds, which took no notice of them. The larvae were present in large numbers in silken galleries matted together with larval frass and fragments of earth in the bottom of the nest. They appeared to be on the alert, occasionally one or two came out and explored the bottom and sides of the nest, but when excreta were voided by the young birds, they swarmed out *en masse* and rapidly devoured it." (Turner, 1923.)

In Uganda van Someren (Proc. Ent. Soc. Lond., II, p. 89, 1928) observed butterflies of the Nymphalid genus *Crenis* to "settle in numbers on one's hands apparently attracted by the moisture of perspiration."

The Lycaenidae are well known to enter into most interesting relations with ants. In some cases either adults or larvae have even learned to milk the ant cows. Thus Bingham (1907a, p. viii, b, p. 287, fig. 73) describes Oriental Lycaenid butterflies of the genera *Gerydus* and *Allotinus,* according to the observations of Barrow, attending aphides, and figures *A. horsfieldi* in the act. Bingham himself thinks that the aphides are tickled by the abnormally long fore-legs, the tibiae of which, in *Gerydus boisduvali* Moore, are flattened, perhaps in connection with this function. Barrow, however, writes (in Bingham, 1907b, my italics) of *A. horsfieldi,* "Its legs are immensely long, and I discovered why. It settles over a mass of Aphides and then tickles them *with its proboscis,* just as ants do with their antennae, and seems to feed on their exudations. . . . It would settle calmly over largish ants and did not mind one or two actually standing up and examining its legs to see who was there. The ants did not attack it in any way." The sketch shows a butterfly touching with its proboscis an aphid apparently held between the fore feet.

Moulton (1910) publishes the testimony of his Dyak collector who saw the Bornean *Allotinus nivalis* Druce stroking an aphid with its tongue. The same collector later brought in another butterfly, *A.* sp. near *nivalis,* with the same kind of aphid, and lastly an example of *A. horsfieldi,* in attendance on an insect which Moulton only provisionally determined as a "Heteropterous larva." I would suggest this was a Membracid nymph.

Lamborn (1914, p. 459) saw the West African Lycaenid, *Megalopalpus zymna* D. & H. milking the Jassid, *Nehela ornata* Dist. and the Membracid, *Leptocentrus altifrons* Wk. on both of which its larvae are predacious. These larvae seem to capture their extremely active prey (both nymphs and adults) by simulating the tickling of the attendant ants. Both male and female butterflies "milk" by tickling with the proboscis.

In Lamborn's paper (*op. cit.,* pp. 469–470) Poulton brings together previous records of butterflies attending Homoptera and adds a personal observation of Moulton, from Borneo of a Gerydine Lycaenid slowly stroking, with its proboscis, a Membracid, *Ebhul varius* Wk. Poulton remarks on the close affinity of the three genera of Lycaenidae concerned.

In Java Van der Goot (1917, p. 34) found the Lycaenid butterfly, *Gerydus boisduvali* Moore, whose larvae live with the ant, *Dolichoderus bituberculatus* Mayr, milking the Coccids attended by this ant, stroking them with its tongue.

Roepke (1918) studied the habits of the same butterfly at greater length. He found both this and *Gerydus symethus* Cr. in large numbers milking the Membracid, *Ebhul varius* Wk. But the chief "cow" of the former is the Coccid, *Pseudococcus crotonis* Gr. "Unaufhörlich waren sie damit beschäftigt, die Schildläuse mit ihrem Rüssel zu streicheln (nicht mit den Pfoten!) und deren flüssige Exkremente aufzusaugen." Thus in contradiction to Bingham, but in agreement with all the other observers, he denies that the secreting insects are tickled with the feet of the butterfly. This is accomplished solely by a movement of the proboscis, which he thus describes, together with the true rôle of the feet. "Der Rüssel ist unaufhörlich in zitternder, suchender Bewegung, immer wieder streichelt er damit die Cocciden über ihren Rücken, mit den breiten Vorderpfoten schiebt er dann und wann seine kleinen, schwarzen Konkurrenten zur Seite. Die eigentümlichen modifizierten Beine dienen also bei dieser Art nur dazu die Ameisen ein wenig von den Schildläusen abzuhalten, nicht aber um letztere zwecks Abgabe ihrer Exkremente zu bearbeiten." The ants do not interfere with the butterflies, though occasionally one may press too close, when the butterfly gives it a light kick with its broad foot.

In Southern Nigeria Farquharson (1922, pp. 388–392) observed the larva of the Lycaenid, *Lachnocnema bibulus* Fabr. feeding upon the secretions of ant-attended Membracids. "Along with one or two ants it tickled with its anterior true legs the business end of the Membracid, . . ."

To Farquharson is due also an observation (*op. cit.*, pp. 347–350) on the Lycaenid butterfly, *Tetroneura isabellae* Dudg., regularly drinking the secretions of ant-attended Coccidae, and even driving away the ants to do so.

HYMENOPTERA: For a very long time we have been familiar with the "milking" by ants of various Homoptera, Lycaenid caterpillars and other insects which yield to the ants' solicitations various excretory products or secretions, of which the honey-dew of aphides and scale-insects is the best-known example. When these ant-cows are actually cared for and protected by the ants, we have a symbiotic relation which Wasmann has named *trophobiosis.* Hitherto only the higher and more specialised subfamilies of ants have been supposed to devote themselves to dairying. There are, however, a few cases now known among the primitive Ponerines. Thus Donisthorpe (1927, p. 171) records the Coccid, *Ripersia donisthorpei* Newst., from nest of *Ponera coarctata* Latr. in England. This is circumstantial evidence of trophobiosis.

Clark (1925, p. 135) writes in Victoria, Australia, "no species (of Ponerine ant) has been observed attending aphids, scale-insects or mealy-bugs on the trees, but at least one species, *Euponera lutae,* generally has a large number of mealy-bugs in its nest."

Finally, in Cuba, Dr. Salt and myself made observations on the large Cixiid Homopteron, *Mnemosyne cubana* Stål, of which the nymphs of apparently all stages are attended assiduously by the Ponerine ant, *Odontomachus haematodes insularis* (kindly determined by Prof. W. M. Wheeler) in its nest. Dr. S. C. Bruner has since sent me further examples of the same nymphs with specimens of this ant which were attending them at the roots of sugar-cane. Lamborn (1914, p. 483) records another race of the same ant (*Odontomachus haematodes*) in West Africa attending the larvae of the Lycaenid butterfly, *Lycaenesthes flavomaculata* S. & K., for their secretions.

The higher ants solicit secretions or excretory products from insects of the following diverse families—

- Homoptera (trophobiontes):
  - Jassoidea (chiefly Bythoscopidae, especially Pogonoscopinae)
  - Membracidae
  - Tettigometridae
  - Cixiidae
  - Delphacidae (*teste* Muir., *v. infra*)
  - Dictyopharidae (Wasmann, Misra)
  - Derbidae (*teste* Muir)
  - Issidae (*Myrmecophryne formiceticola* Kirkaldy) Queensland
  - Psyllidae (especially in Australia; regularly also in Cuba)
  - Coccidae
  - Aleyrodidae
  - Aphididae
- Heteroptera:
  - Pentatomidae (*Coptosoma* nymphs in Ceylon, Green)
  - Reduviidae (*Ptilocerus,* ant-predator; secretion apparently anaesthetic)

Lepidoptera (trophobiontes):
- Lycaenidae
- Cyclotornidae (Australia)

Diptera, Coleoptera and Hymenoptera: trichome-bearing guests belonging to a very large number of families (especially Coleoptera) fully dealt with in the works of Wasmann, Donisthorpe, Wheeler, Reichensperger, Forel, Escherich. In the Hymenoptera also there must not be forgotten the ants' own larvae, which in some groups, notably the Pseudomyrminae, are even provided with lengthy exudatoria (Wheeler).

In addition, according to Forel, the mite, *Glyphopsis formicariae,* is furnished with trichomes, and is thus presumably a purveyor of secretions to the ants among which it lives.

The Coccidae attended by ants are practically exclusively non-Diaspine forms. Whether the Diaspines are ever attractive to ants seems very doubtful. Mr. Green, Mr. Laing and Dr. Morrison have all informed me that they know no cases. The few records in the literature are perhaps erroneous. Thus Urich (1913) found *Aspidiotus destructor* in Trinidad generally injurious when associated with the Balata ant (*Azteca chartifex*). When ants were absent, ladybirds became an efficient check. Whether this implies direct attendance by the ants, or merely their hostility to ladybirds is general, is not clear. Cockerell definitely records the ant, *Pheidole cockerelli* Wh., attending the date-palm scale, *Parlatoria blanchardi* (Targ.) in Arizona (*teste* F. H. Simmons).

One sometimes meets with the general statement that Cercopidae are among the Homoptera kept as "cows" by the ants. Belt obviously uses the term "froghopper" as equivalent to "leafhopper" or to Auchenorrhyncha in general. True Cercopidae, in their nymphal instars, normally dwell on the stems of plants, in a small surrounding mass of frothed-up liquid (so-called "cuckoo-spit") or in limy tubes. It seems to me almost certain that all general records of Cercopids as ant-guests really refer to Jassids, many of which, to the non-specialist, look extremely like true froghoppers. Lund (1831) mentions that in Brazil the chief Homoptera attended by ants are "Cicadelles," especially those of the two genera *Cercopis* and *Membracis.* He describes these insects as massing on young stems of plants and producing with their bite monstrous growths like those induced by aphids in Europe. This description would apply more or less to Psyllids and to Membracids, but decidedly not to Cercopids.

Mann (1915, p. 162) records an undetermined Cercopid as a guest *inside* the nest of the Haitian ant, *Aphaenogaster relicta epinotalis* Wh. & M. From his brief description this is almost certainly not a Cercopid. We believe, therefore, that in the present state of our knowledge, the Cercopidae should not be listed among the "ant-cows" until at least some definite species has been thus authoritatively recorded.

With regard to the Delphacidae, apparently no definite observations of attendance by ants are on record. It is true that Mungomery (1927) mentions "hoppers" and aphids associated with ants (*Aphaenogaster longiceps* Sm.) in Queensland, and states that the former "belong to the families Delphacidae and Jassidae, . . ." but there is every indication that the Fulgoroids present really belonged to the closely related family of Cixiidae, which are well-known ant-cows, in subterranean nests. Mr. F. Muir, however, has observed ants assiduously attending the Delphacid, *Sogatopsis pratti* Muir, on bamboo in Amboina and at Singapore; and he has seen members of another genus similarly sought in the Philippines. (In conversation, March, 1928).

The relations between ants and Coccids seem to be truly symbiotic, in the sense that both parties reap very considerable advantages from the association. The protection afforded by those ants which build carton covers over their cattle, collect and tend their eggs and so on, has been sufficiently and clearly described. Yet Green (1913) considers the silken shelters constructed over *Lecanium hemisphaericum* Targ. by the redtree ant, *Oecophylla smaragdina,* to offer no security against Braconid parasites and a carnivorous caterpillar (*Eublemma* sp.). These shelters, however, as I have seen in Ceylon, are very flimsy and not comparable in strength of texture with those built for the brood itself.

What measure of protection is conferred by those ants which merely milk their animals in the open is still less certain. Wheeler in 1910 considered there was at least protection from predatory enemies. The aphid cornicles, which Büsgen showed to secrete a repugnatorial substance, are said by Wheeler to be absent chiefly in those species which live in the closest association with ants. Büsgen observed ants driving Chrysopid larvae away from their aphids, and Wheeler mentions that Ferton was impressed by the jealous surveillance of the ants, especially against aphid-hunting fossorial wasps.

Keuchenius (1914, 1915) and Van der Goot (1915, 1916) in Java believed that the ants *Lagiolepsis longipes,* protect in no way whatever, from its natural enemies, the Coccid, *Lecanium* (*Coccus*) *viridis,* which they attend for honey-dew. Nevertheless, long and very careful experiments showed the latter worker that the presence of these ants exerts an extraordinary favourable influence on the development of the scale-insect in question. On ant-infested bushes the death-rate of the scales is considerably lower, they develop more rapidly; their parasitisation by Hymenoptera is reduced, and their progeny is actually twenty times more numerous. While denying any direct defence whatever against natural enemies, Van der Goot attributes this result to promotion of more frequent excretion, and to resulting acceleration of feeding and metabolism in general, by the "milking" on the part of the ants.

The experiments of Bos (as quoted by Forel, 1928, I, pp. 494, 497) on bean-infesting aphids, seem to lead to a similar conclusion though Forel believes that the aphids are also directly protected at least by the carton shelters.

Eidmann (1927, p. 35) considers that species attended by *Lasius niger* are very well guarded against natural enemies. He found that these ants set an actual aphis-sentry (Blattlauswächter) or even a whole aphis-guard of ants, which do not milk the cows themselves, but protect them from predators and parasites, and if necessary carry the alarm to the nest. He continues, "As ich vor längerer Zeit den Blattlausparasiten Trioxys studierte, konnte ich feststellen, dass die Parasitierung im wesentlichen von dem Vorhandensein von Ameisen bei den Blattläusen abhangig ist, und dass diese ihre Melkkühe gegen die Angriffe der Parasiten nachdrücklichst zu schutzen wissen."

More recently Eidmann has published further observations (*Zeits. angew. Entom.* XIII, S. 559–563, 1928) on the same species of ant, *Lasius niger,* showing that an aphid-sentry may remain "on duty" for long periods, day after day. It seems also that, at least in early spring, each aphis is guarded by one definite and individual ant.

It was computed that during a summer of 100 days, one colony of ants which, at time of counting contained 3,456 workers and about 11,600 larvae and pupae, was supplied, by its aphis-herd, with about one litre of honey-dew.

The only case known to me of Hymenoptera other than ants directly soliciting secretions is that of a Nicaraguan wasp (Vespidae, *Nectarina* sp.) described by Belt (1874, p. 228). "The wasp stroked the young hoppers, and sipped up the honey when it was exuded, just like the ants. When an ant came up to a cluster of leaf-hoppers attended by a wasp, the latter would not attempt to grapple with its rival on the leaf, but would fly off and hover over the ant; then when its little foe was well exposed, it would dart at it and strike it to the ground. The action was so quick that I could not determine whether it struck with its fore-feet or its jaws; but I think it was with the feet. I often saw a wasp trying to clear a leaf from ants that were already in full possession of a cluster of leaf-hoppers. It would sometimes have to strike three or four times at an ant before it made it quit its hold and fall. At other times one ant after the other would be struck off with great celerity and ease, and I fancied that some wasps were much cleverer than others. In those cases where it succeeded in clearing the leaf, it was never left long in peace; for fresh relays of ants were continually arriving, and generally tired the wasp out. It would never wait for an ant to get near it, doubtless knowing well that if its little rival once fastened on its leg, it would be a difficult matter to get rid of it again. If a wasp first obtained possession, it was able to keep it; for the first ants that came up were only pioneers, and by knocking these off it prevented them from returning and scenting the trail to communicate the intelligence to others."

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A Correction.—Recently Mr. J. D. Gunder called my attention to the fact that Mr. Strecker has used the name "*alba*" for a form of *Eurymus philodice*. In this Bulletin, Vol. XXII No. 2, pp. 118–119, I have described a variation of the form *plicaduta*, and called it "*alba*," which I desire to change to "**albida.**" The name should read: *Eurymus philodice* f. *plicaduta* var. **albida.**

F. H. Chermock,
Pittsburgh, Pa.

SOME SOUTH AMERICAN CORIXIDAE.

By H. B. Hungerford, Department of Entomology, University of Kansas, Lawrence, Kansas.

For many years the study of the South American Corixidae has been neglected. I have been gathering together material for the past ten years, and although there are still vast tracts from which I have no material, I feel that some progress should be reported. Three excellent papers by Dr. Tadeusz Jaczewski have appeared during the past year—the first one reporting the material he collected while a member of the Polish Zoological Expedition to Brazil in 1921–24. The first plate of drawings submitted with the present paper was prepared for the printer before I learned that Dr. Jaczewski was preparing a report. Upon hearing from him that his "Corixidae from the State of Paranà" would soon be published, I withdrew my paper from publication. I was interested to find that we had studied five species in common, and that out of eleven species figured on my plate, five were figured by him. Since my zinc cut was already made, I am using it here to delineate the six species not seen by Dr. Jaczewski.

In Dr. Jaczewski's "Argentinian Corixidae collected by Mr. A. C. Jensen-Haarup, 1927," are described *Sigara jensen-haarupi* and *Trichocorixa mendozana.* The former species is distinguished from related South American species by the absence of a strigil. In remarking upon the presence or absence of a strigil and its generic significance, I am credited, with others, with believing in the generic significance of this character. Attention might be called to the fact that several years ago I described as *Arctocorixa compacta* a species without a strigil.

The *Trichocorixa mendozana* Jaczewski is the first printed record of the genus in South America. I have had in my collections material from two or three South American republics for a long time. Central America and the Antilles abound with these insects. I have also species from Bermuda and Galapagos Islands. The species described as *Corixa blackburni* White and later assigned to *Arctocorixa* by Kirkaldy is a member of the *Trichocorixa* group. In commenting upon the species of *Trichocorixa,* Dr. Jaczewski notes that *Corixa sexlineata* Champion is a *Trichocorixa* and that the name *sexlineata* is preoccupied. His suggestion of a new name *T. championi* is not necessary, however, since Mr. Kirkaldy in 1908 renamed the species *C. naias.*

Corixa williamsi sp. n.

Size: 6 mm. long. Females a little longer and males a little shorter.

Color: Trifle lighter than the medium, appearing shiny yet minutely rastrate when seen under the binocular. Pattern coarse. Cross bands of hemelytra slightly wavy. Pronotum crossed by five to seven pale bands that are about the same in width as the dark ones. Bands on middle of the disc somewhat split or even broken. Base of clavus paler than remainder of the hemelytra, the pale bands considerably broader than the brown ones in this area. The transverse bands of the middle of the clavus continuous with those of the corium. Pale bands slightly congested as they cross the tip of the clavus. Membrane pigment pattern of same general tone as other portions of hemelytra. Venter pale.

Structural characteristics: Interocular space broad. The anterior curve of the vertex, as viewed from above slightly projected in front of that of the eye. Facial depression of the male slight, margin ill defined. Metaxyphus elongate triangular. Female pala of usual form. Male pala as shown in Figure 12, Plate VII. Asymmetry left, strigil absent. A patch of hairs behind the customary position of the strigil.

Described from eight specimens—three males and five females—taken by Dr. F. X. Williams in Tunguragua Vale, Baños, Ecuador, January 1, 1923.

This is a most unusual species! I have quite tentatively assigned it to the genus *Corixa.* I have, besides the seven specimens, another adult male, and four nymphs. The male is beyond question an example of reversed asymmetry. The asymmetry is right, but in color pattern, absence of strigil, shape of pala and genital capsule, this insect is identical with those described.

Arctocorixa rubyi sp. n.

Size: 6.5 mm. long.

Color: Of medium color tone. Thorax crossed by about seven dark bands which are slightly narrower than the intervening pale bands. Hemelytra pattern not barred except the anterior angle of the clavus. Pigment of even distribution in slender short vermiculate figures, on membrane as well as elsewhere. Underside of body pale except the basal abdomen segments which are cloudy.

Structural characteristics: Interocular space broad. Anterior curve of the vertex as seen from above plainly produced beyond the curve of the eye. Facial depression deep attaining the eyes laterally. Anterior part of pronotum faintly carinate. Pronotum rastrate but hemelytra smooth. Metaxyphus truncate at tip. Strigil small, of four striae. Pala of male of usual form, fairly thick, and provided with a row of twenty-nine pegs, the distal half of which approach the upper outer margin of the pala (distal pegs much longer than the others). The clasper of the male genital capsule provided with broad retrorse barbs as shown in Figure 5, Plate VI.

Described from two males and two females taken by Miss Ruby Hosford in 1923, Buenos Aires (Mercedes), S. A.

A. rubyi var. **schadei** var. n.

This is very near the species described above. The male pala appears less carinate on the back, and thinner, and the clasper of the male is slightly, but consistently, different as shown in Figure 8, Plate VI. I have a series of these insects from Paraguay, taken by F. Schade.

Arctocorixa hosfordi sp. n.

Size: 5.5 mm. long, females slightly larger.

Color: Darker than preceding species. The seven brown bands of the pronotum broader than the pale ones. Pigment pattern showing a predominance of the dark over the light, light figures short irregular blotches, arranged very faintly into longitudinal series. Basal part of clavus banded.

Structural characteristics: Distinguished from the preceding species by the short, thick pala of the male. Interocular space of male less than the width of an eye. Anterior curve of vertex as seen from above projected somewhat beyond the curve of the eyes. Slight median carina on head. Metaxyphus short, blunt. Strigil as in preceding species. Male genital capsule as shown in Figure 6, Plate VI. Pala bearing 28 pegs in a row that arises near the lower base and extends near to the upper distal margin where it curves down transversely.

Described from four specimens taken by Miss Hosford at Mercedes, Buenos Aires, S. A.

Arctocorixa denseconscriptoidea sp. n.

Size: 6 mm. long.

Color: Of usual color, colors distinct. The seven dark bands of pronotum clear cut, as wide as the pale ones. Hemelytra not barred. Base of clavus with broken transverse bands. Pigment elsewhere of about equal distribution of light and dark short twisted and furcate figures in faintly longitudinal series. Venter pale.

Structural characteristics: Males with vertex connate as seen from above, low median carina. Facial depression deep, narrow and well marked. Male pala longitudinally carinate on the back. Palar pegs 23 in number arranged in the usual curve. Metaxyphus rather long and broadly rounded at tip. Strigil of moderate size, longer than broad, of four broad striae. Male genital capsule as shown in Figure 10, Plate VI.

Described from 21 specimens taken at São Paulo, Brazil, by R. Spitz.

Notes: This species is the most readily recognized species I have seen in all of this group of South American Corixidae.

Arctocorixa chrostowskii var. **brachypala** var. n.

Size: 5.9 mm. long.

Color: Somewhat darker than the normal. Seven brown bands that are broader than the pale ones on the pronotum. Hemelytra markings without characterization that would distinguish this species from the others.

Structural characteristics: This species has a short, broad male pala strongly curved forward at tip. The pala is thin but provided with a short longitudinal carina on the back. Strigil of medium size, round, of four striae. Metaxyphus short, broadly rounded. Male pala and male genital capsule as shown on Plate VII, Figures 3 and 6.

Described from material taken by E. D. Townsend, São Paulo, Brazil.

Arctocorixa chrostowskii var. **townsendi** var. n.

Size: 5.2 mm. long.

Color: Darker than the above species. The five or six pale bands on pronotum slender. The six brown bands well marked. Hemelytra pattern as in species above.

Structural characteristics: Besides being a smaller species than the preceding, the anterior curve of the vertex as seen from above is slightly sharper, making the head appear a little longer. The figures on Plate VII (Figures 4 and 5) show the differences between this species and the preceding. For some time I considered the two varieties of one species because the male claspers are very close. A careful comparison will show the differences which in some of the related species would be within the range of specific variability.

Described from material taken by E. D. Townsend, São Paulo, Brazil.

Arctocorixa fazi sp. n.

Size: 8 mm. long.

Color: Normal for the family. 7 dark bars on pronotum. The hemelytra not barred, the pigment of about even distribution in brown and pale vermiculate figures.

Structural characteristics: This is the largest form of these related South American species. The head is short, the anterior curve of the vertex continuing that of the eyes. Interocular space broad but not quite as wide as an eye. Facial depression of male not deep or well marked. Pronotum and clavus minutely rastrate. Pronotum with faint median longitudinal carina. Metaxyphus of normal length but broadly rounded at tip. Strigil of male elongate of 6 or 7 narrow striae. Male genital capsule as shown in Plate VI, Figure 12. The pala of male is elongate with upper and lower margins nearly parallel. About 32 pegs in the row.

Described from a long series collected by A. Faz, on various dates. The holotype labeled as follows: Termas Cauquenes, Chile, S. America, Dec. 15, 1922. Alfredo Faz.

Arctocorixa fazi var. **termasensis** var. n.

This variety is smaller than the species described above. The maculations on the hemelytra are coarser and the male genital claspers are different though of the same general type. The shape of the male pala and the position of the row of pegs is distinctly different and readily separates this form from the much more abundant *A. fazi.* Since this form was taken at the same place and on the same date, I consider that these two may not be entirely distinct species.

Arctocorixa santiagiensis sp. n.

Size: 6 mm. long.

Color: The color pattern of somewhat finer figures than in *A. forciceps* Spin. The six or seven dark bands of pronotum less broken than in *A. forciceps* Spin.

Structural characteristics: While I confused this species with *A. forciceps* Spin. for a time, the metaxyphus is considerably more elongate. The interocular space is greater, the upper margin of the male pala more evenly curved, the pegs more numerous (39 in number) and basal ones smaller in size. The shape of the clasper of the male genital capsule as shown in Plate VI, Figure 1, is quite distinctive.

Holotype specimen from Santiago, Chile, South America, Alfredo Faz (No. 25123). A number of other males from same locality were dissected and found to agree with the type.

I am quite aware of Dr. F. Schumacher's contention (in Ento. Zeitschr., Berlin, 1924) that *Sigara* must have precedence but this involves more changes in nomenclature than seem advisable at this time. Dr. Jaczewski has accepted the restored *Sigara* and has placed his new South American species under that name (Corixidae from the State of Paraná, Annales Zool. Mus. Polonica Historiae Naturalis. I. VI. 1927).

As a matter of fact, this group of South American corixids has a general facies and a bizarre type of right genital clasper that makes it questionable whether they should be assigned to the same group with any old world species.

Plate VI.

Fig. 1. *Arctocorixa santiagiensis* sp. n., genital capsule of male.
Fig. 2. *Arctocorixa czakii* (Jaczewski), genital capsule of male.
Fig. 3. *Arctocorixa forciceps* (Spin.), genital capsule of male.
Fig. 4. *Arctocorixa hungerfordi* (Jaczewski), genital capsule of male.
Fig. 5. *Arctocorixa rubyi* sp. n., genital capsule of male.
Fig. 6. *Arctocorixa hosfordi* sp. n., genital capsule of male.
Fig. 7. *Arctocorixa chrostowskii* (Jaczewski), genital capsule of male.
Fig. 8. *Arctocorixa rubyi* var. *schadei* var. n., genital capsule of male.
Fig. 9. *Arctocorixa denseconscripta* (Breddin), male clasper.
Fig. 10. *Arctocorixa denseconscriptoidea* sp. n., genital capsule of male.
Fig. 11. *Arctocorixa denseconscripta* (Breddin), genital capsule of male.
Fig. 12. *Arctocorixa fazi.* sp. n., genital capsule of male.

Plate VII.

Fig. 1. *Arctocorixa dita* (Jaczewski), pala of male (specimen det. by Jaczewski).
Fig. 2. *Arctocorixa dita* (Jaczewski), genital capsule of male, specimen det. by Jaczewski.
Fig. 3. *Arctocorixa chrostowskii* var. *brachypala* var. n., genital capsule of male.
Fig. 4. *Arctocorixa chrostowskii* var. *townsendi* var. n., pala of male.
Fig. 5. *Arctocorixa chrostowskii* var. *townsendi* var. n., genital capsule of male.
Fig. 6. *Arctocorixa chrostowskii* var. *brachypala* var. n., pala of male.

Fig. 7. *Arctocorixa fazi* var. *termasensis* var. n. (by Faz in Chile). Pala of male.
Fig. 8. *Arctocorixa jensen-haarupi* (Jaczewski), right clasper of male. Copied from the author.
Fig. 9. *Arctocorixa jensen-haarupi* (Jaczewski), male pala, copied from the author.
Fig. 10. *Arctocorixa fazi* var. *termasensis* var. n. (by Faz in Chile). Genital capsule of male.
Fig. 11. *Corixa williamsi* sp. n., genital capsule of male.
Fig. 12. *Corixa williamsi* sp. n., pala of male.
Fig. 13. *Corixa williamsi,* sp. n., genital capsule of a male, showing reversed asymmetry.

Blaps mucronata Latr. in Cincinnati, O.—May 23, 1927, this Tenebrionid beetle was first observed running over the unpaved portion of the cellar floor of the Cincinnati Society of Natural History Museum Building, Cincinnati, Ohio.

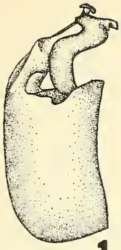
A survey of many cellars in the city reveals that they also have been invaded by this European species. A large Grainery across the Ohio River in Covington, Ky., is swarming with them, in company with *Tenebrio,* etc. Specimens sent to Museums and Coleopterists have been reported as new to them.

Dr. Blaisdell, in his Eleodiini paper (Bull. U. S. Nat. Museum No. 63—P. 502), refers to the occurrence of *Blaps* in the U. S.

I have taken at Cincinnati, Ohio—another European beetle, viz., *Anommatus 12-striatus* Muls, one specimen. This curious little species was on the ground under a pile of cut lawn grass. No additional specimens have been found.

I am indebted to Mr. Herbert S. Barber, of the U. S. Nat. Museum for the identification of these two species.

Charles Dury, Cincinnati, O.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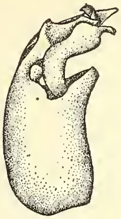
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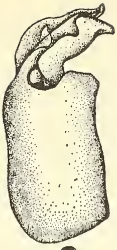
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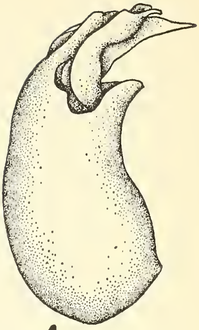
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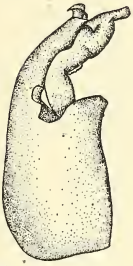
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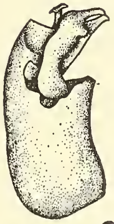
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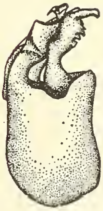
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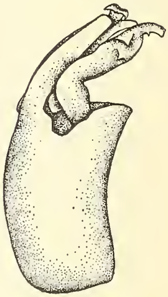
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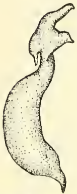
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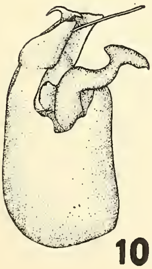
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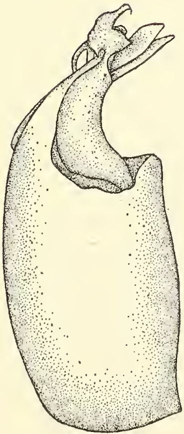
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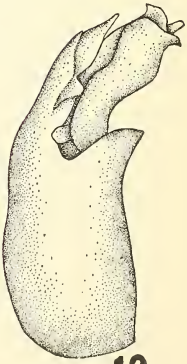
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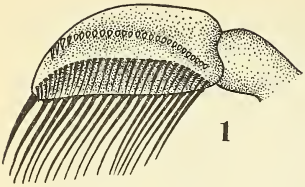
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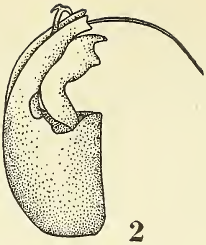
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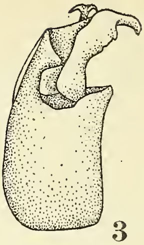
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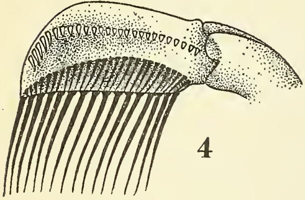
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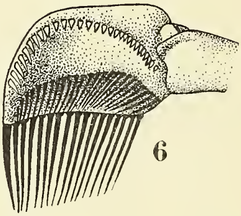
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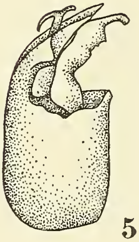
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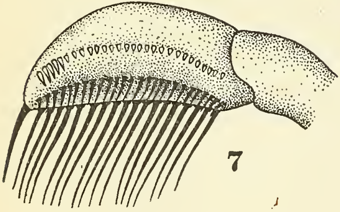
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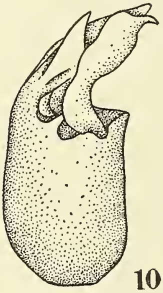
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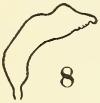
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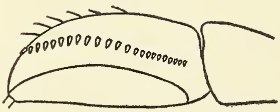
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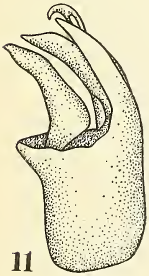
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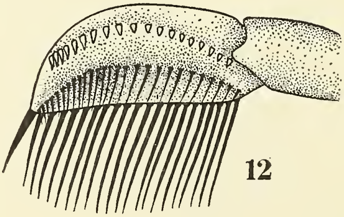
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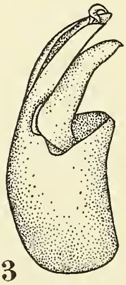
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A NEW SPECIES OF LUPERODES FROM MT. MITCHELL, NORTH CAROLINA.

By D. H. Blake, Bureau of Entomology, Washington, D. C.

Among a lot of Chrysomelidae sent to the Bureau of Entomology for determination is a new species of *Luperodes* collected by Professor Franklin Sherman, who writes that it was "abundant on the foliage of some bush near the top of Mt. Mitchell (6,000 ft. or over) 20 June, 1926."

Luperodes bimarginata, n. sp.

Shining blue black or black, with legs and antennae dark brown or piceous; elytra with a longitudinal fold parallel to margin, running from behind humerus to angle of apical narrowing. Antennae dark brown, with lighter basal joints, third joint a little longer than second, fourth not quite as long as second and third together. Head entirely dark with no pale brown on clypeus or mandibles, shining alutaceous with a few scattered obsolete punctures, transverse frontal groove well marked. Prothorax transverse, not twice as wide as long, widest before middle and arcuately rounded anteriorly with obtuse apical tooth, an acute tooth at basal angle and narrow lateral margin; surface shining, sparsely and lightly punctate. Scutellum black or piceous, polished. Elytra not quite twice as wide as prothorax, over twice as long as wide, with sides subparallel, slightly wider below middle; humeri well rounded, a distinct fold running from behind humeri and parallel to margin, to angle of apical narrowing, in the female much more pronounced. Surface shining, and as head, distinctly alutaceous, and lightly, sparsely punctate, punctation deeper than on pronotum; a few scattered suberect hairs on apical portion of elytra. Body beneath shining dark blue black or piceous; anterior legs from knees paler brown, other legs with dark blue or black femora and piceous tibiae and tarsi. Basal joint of male hind tarsi not dilated and as long as following two joints combined.

Length 4.5–4.8 mm. Width 2 mm.

Holotype male and *paratypes* (2 females, 3 males), Cat. No. 40974 U. S. N. M.

Type-locality: Mt. Mitchell, North Carolina, 6,000 ft.

Collected by Professor Franklin Sherman.

This species most resembles *L. meraca* Say, but differs from that in the darker colouring of the legs and antennae. *L. meraca* has pale yellow antennae, and the tibiae and tarsi of all legs as well as the clypeus and mandibles are also pale. In addition, *L. bimarginata* is unique in having a lateral fold in the elytra, apparently especially marked in the female. In *L. meraca* faint longitudinal depressions behind the humerus are frequently seen, but not as marked as in *Luperodes bimarginata.* In addition to these differences common to both sexes, there are certain characters in the last abdominal segments of the males. In the female *Luperodes* the last visible sternite is rounded, whereas in the male the corresponding sternite is impressed in the middle of the apex and truncate. But behind this in the male is visible the under surface of the 8th tergite with somewhat three-lobed opening, consisting of two side lobes, variable in the width of opening, and an apical lobe. This structure and the shape of the depression on the preceding segment show considerable variation in different species of *Luperodes.* In *L. meraca* the sides of the apical lobe are well rounded, and the tip is round, whereas in *L. bimarginata* the tip is acute, with the sides of the apical lobe almost straight.

A SUPPLEMENTAL REVIEW OF THE GENUS OPHIOLA EDWD. (CONOSANUS O. & B.) IN N. A.

(Homoptera, Cicadellinæ.)

E. D. Ball, Univ. of Arizona, Tucson, Ariz.

The genus *Ophiola* Edwd. with *Athysanus striatulus* as the type will include all the species listed under " AA " of *Conosanus* by Osborn and Ball in their Review of the Genus Athysanus. This is one of the largest divisions of the old genus *Athysanus* (*Euscelis* of the Van D. Cat.) in our fauna and has been one of the most difficult in which to make determinations. As a result of the study of original type material a number of corrections and a few additions have been found necessary. With this new light on the group accurate determinations should now be possible and when the species are correctly separated it will probably be found that most of the species are closely restricted to single host plants.

Key to the Species of Ophiola Edw.

A—Short and stout, cone-nosed, elytra but little exceeding the body, the apical cells broad and relatively short.
  B—Species Black, or heavily black marked.
    C—Most of elytral nervures creamy white . . . 1—*uhleri* Ball.
    CC—Nervures concolorous . . . . 2—*anthracina* V. D.
  BB—Species brown or straw color inscribed with dark.
    D—Small, less than 4 mm.
      E—Vertex heavily inscribed with dark. 3—*arctostaphyli* Ball.
      EE—Vertex pale sulfur, unmarked. Straw color faintly inscribed . . . . 4—*humida* Osb.
    DD—Large 4.5 mm. or over. Straw color faintly ininscribed (Western) . . . . 5—*shasta* Ball.
AA—Elongate elytra definitely longer than body, inclined to be flaring. The central anteapical cell elongated.
  F—Large, broad, straw color very sparsely inscribed (Western).
    G—Face tumid, unmarked, two spots on vertex against either eye about equal in size. 6—*calvata* Ball.
    GG—Face normal with several transverse lines. Anterior spots on vertex large, often connected by a black line; posterior spots often wanting . . . . 7—*gentilis* V. D.

FF—Smaller, narrower, with narrower less inflated fronts usually heavily inscribed.

H—Elytra extremely long and narrow, much longer than the body, apical cells elongate. Species very dark with narrow pointed heads or very small, paler with *Cicadula*-like markings.

I—Long, dark, with conically pointed head. 8—*plutonia* Uhl.

II—Small, pale, with an obtuse head and *Cicadula*-like appearance. 9—*angustata* Osb.

HH—Elytra longer than body but not extremely long and narrow. Species pale olive to brown with darker markings.

J—Large, pale, testaceous, with a tumid rounding vertex and front of pale fulvous with slight markings in the female. Male plates enlarged at base. 10—*symphoricarpae* Ball.

JJ—Slightly smaller and narrower with a less inflated vertex and heavier markings.

K—Vertex definitely though slightly obtusely pointed. Front and middle femora pale with dark bands.

L—Elytra long, flaring, vertex and face with definite black markings. Fore and middle femora twice banded with white. 11—*striatula* Fall.

LL—Elytra shorter not flaring. Vertex and face with wavy testaceous markings. Fore and middle femora with a single sub-apical band . . . 12—**comptoniana** n. sp.

KK—Vertex broadly rounding, or with a slight indication of an angle in the male. Fore and middle femora shining black to just before the apex, then abruptly orange as are the tibiae. 13—**osborni** n. sp.

Ophiola uhleri Ball.

Athysanus (*Conosanus*) *Uhleri* Ball, Can. Ent., 43, p. 200. 1911.

Athysanus (*Conosanus*) *plutonius* O. & B., Rev. Athy., p. 02. 1902 (not Uhler).

This broad dark species was recognized as *plutonius* Uhl. by all the workers for some time and so listed by Osb. and Ball in their Review. The writer later examined the Uhler type and found that it represented a much longer and narrower species and that this species was still undescribed.

Ophiola uhleri var. **speculata** n. var.

Resembling *uhleri* in size and form but lacking most of the black coloration—uniform yellowish brown, or with slight markings.

Pale brown above, the vertex with a pair of dark dashes just back of apex and a broken band across the disc just back of the ocelli, sometimes a pair of dusky spots on the anterior disc of pronotum and a faint apical margin to the elytra. Face pale yellowish with the sutures and 3 or 4 arcs above black. Fore and middle femora black to just before the yellow apex; the black area with an elongated light spot on anterior margin.

Holotype, female, Speculator, N. Y., August 6, 1912, in the writer's collection; one paratype, female, same date in the N. Y. State collection; one paratype, female, Ithaca, July 25, 1895, in the writer's collection. This variety is apparently distributed throughout the upper Appalachian region, as examples from Greensburg, Pa. (Wirtner), approach this form.

Thamnotettix glomerosa Ball = *Ophiola calvata* Ball, known only from western Colorado and Utah.

Euscelis finitimus V. D. is apparently a color variety of *Ophiola gentilis* V. D. The writer has material from B. C., Calif., Oreg., and Montana.

Ophiola plutonia Uhl.

Jassus plutonius Uhl., Bull. U. S. Geol. Surv., III, p. 470. 1877.

Athysanus instabilis V. D., Can. Ent., XXV, p. 284. 1893.

Athysanus elongatus Osb., Me. Agr. Exp. Sta. Bull. 238, p. 129. 1915.

The extreme difficulty of recognizing closely allied species in this group from descriptions is well exemplified in this case. All subsequent workers placed Uhler's name *plutonius* on the species now called *uhleri.* Following others in this error Van Duzee redescribed the true *plutonius* as *instabilis.* Osborn and Ball apparently did not have this species in hand at the time of the Review. No type of *instabilis* was available in the V. D. collection and, misled by Van Duzee's reference to the second cross nervure, they thought he was describing the dark form of *striatulus* and so listed it. Osborn later recognized the species as distinct and described it as *elongatus.*

The writer has studied the unique Uhler type now in the National Museum and through the kindness of Prof. Pettit has before him two female "types" of *instabilis* from the Michigan collection, a pair of paratypes of *elongatus* from Dr. Osborn, as well as material from Me., N. H., N. J., Md., Ontario, Mich., several places in Colo., and Hood River, Oreg. All of the locations are in broken or mountainous regions except the Michigan specimens and they may have been from the northern peninsula. It is probably confined to some shrub that occurs in such regions. The Colorado examples were all from elevations of 7,000 to 10,000 feet. Only one of these examples has a second cross nervure and even here it is only on one side and is really a doubling of the first cross nervure.

The dark color with the extremely long, narrow elytra will separate this species from all others except dark example of *striatula* which are broader and usually more definitely banded on the vertex.

Ophiola striatula Fall.

Cicada striatula Fall, Hem. Suec., II, p. 45. 1826.
Athysanus striatulus Fall? (or *vaccinii*) Van. D., Ent. Amer., VI, p. 134. 1890.
Euscelis vaccinii V. D., Cat., p. 659. 1917 (not Osb. & Ball).

This cosmopolitan and quite variable species was made the type of the genus *Ophiola* by Edwards. In Europe it has few relatives but in this country a majority of the thirteen species here listed have at one time or another been included under *striatula.*

There were no types of *vaccinii,* as such, in the Van Duzee collection. Osborn and Ball in the Review were in error in treating the common and widely distributed species, which appeared to answer the description, under this name (see *osborni* below).

The writer has studied examples of *A. striatulus* from five different European sources and finds that they all agree in representing the broad and very variably colored species so abundant on cranberry marshes and similar situations. Through the kindness of Dr. Headlee the original examples sent to Van Duzee by Dr. J. B. Smith and for which the name *vaccinii* was suggested if it proved to be distinct from *striatulus* have been examined. (The handwritten label is identical with a label in the Van Duzee collection from which the specimen has been lost.) These specimens are typical *striatulus.* Through the kindness of Dr. B. F. Driggers the writer has been able to examine an exceedingly long series of leafhoppers from the cranberry bogs of N. J. and this was the only species of this group that occurred there, so there seems to be no doubt that the two species are identical as originally determined by Van Duzee and again suggested in his Catalog.

This species as now limited occurs from Maine to British Columbia, but does not extend much further south except in the eastern bogs of N. Y. and N. J. and in the higher meadows of the Rocky Mountains where it is at hand from as far south as Colo.

Ophiola striatula var. **cacheola** n. var.

Resembling *striatula* in form and structure but much darker. Shining black with seven spots in two transverse rows on vertex, three in front and four behind. Six irregular spots on the anterior submargin together with numerous dots on the disc of the pronotum white. The apices of the claval nervures, the cross nervure between sectors and sometimes the adjoining nervures white. Face and below black, a few dots on lower part of face and the apices of the anterior and middle femora yellow.

Holotype male and 2 paratype males taken by the writer from the top of the Wasatch Range near Logan, Utah, in July. These examples may represent a distinct species or even a black form of the tawny *symphoricarpae* but until more is known of their foodplants and variations they are best considered as an extremely dark form of *striatula.*

Ophiola comptoniana n. sp.

Resembling *arctostaphyli* but slightly longer and slenderer, smaller and less definitely marked than *striatula*; pale tawny with numerous markings as in *striatula* but wavy in outline and blending in color. Head much more conically pointed than in either species. Vertex almost right angled, the line between ocelli almost in middle of disc, the submarginal lines long, irregular in outline, angled forward but with a light margin in front equal to that behind basal line; a double curve with a broad light area behind. Pronotum closely inscribed with wavy brown lines, omitting the fulvous anterior margin; scutellum irregularly mottled. Elytra but little longer than abdomen in female, longer and more slender in male, tawny, the pale nervures slightly margined with dusky, transverse nervures broadly ivory. Venation simple, sometimes extra reticulations along claval suture but no second cross nervure. Front tawny with pale arcs, lower part of face pale with dusky sutures, clypeus pale yellow with a dark line. Legs pale with faint testaceous markings. Genitalia; female segment moderately long, truncate, pale with a dark median marginal spot; male valve large, obtusely triangular; the plates broad at base, roundingly triangular, three times the length of valve.

Holotype female, allotype male, and 4 pairs of paratypes from Roselle Park, N. J. These were taken by the writer together with numerous nymphs on the Sweet Fern (*Comptonia peregrina* L.). This is apparently a strikingly distinct and relatively uniformly marked species, the wavy lines with their varying shades give it a distinction hard to describe.

Ophiola osborni n. sp.

Athysanus (*Conosanus*) *vaccinii* Osb. & Ball, Review, Ohio Nat., II, p. 242. 1902. (Not Van D.)

Resembling *striatula* but lighter colored with a definite orange cast. Dirty olive or rusty straw with definite orange on the vertex and scutellum. Below dark, the fore and middle femora black, to just before the apices then abruptly orange including the tibiae. Length 4–4.5 mm.; width 1 mm.

Vertex sloping, little longer on middle than against the eye, twice wider than long. Elytra longer than the abdomen, slightly shorter than in *striatula*. Central anteapical cell long and narrow, enlarged at the apex.

Holotype female, allotype male, and 4 pairs of paratypes from Ames, Ia., collected by the writer, a pair of paratypes, Little Rock, Ia., collected by Osborn and Ball. This species is most easily recognized by the orange color on the vertex and scutellum and the definite yellow "knees." It is the most abundant species in the group in dry situations from Ontario to Maryland and west to Montana and Colorado east of the main range of the Rocky Mountains. Its dedication to Dr. Herbert Osborn is doubly appropriate, as it is an abundant species in the region of his greatest activity, and in a group in which he has made many valuable contributions.

A NEW SPECIES OF LONCHAEA FALLEN (LONCHAEIDAE, DIPTERA).

By RAYMOND L. TAYLOR, Bussey Institution, Harvard University.

All workers who have bred out forms from the terminal shoots of white pine or other host plants weeviled by *Pissodes strobi* have encountered a species of *Lonchaea* in more or less abundance. For instance, Graham[1] refers to ". . . a fly . . . *Lonchaea rufatarsus*," i.e., *L. rufitarsis* Macq. which is now considered to be *L. polita* Say; MacAloney[2] has obtained a fly which was determined for him as *L. laticornis* Meigen; while Barnes[3] found a species of this genus which was determined for him by Aldrich as new. In the past two years, the writer has bred out an extensive series of a fly of this same genus from the caged shoots of white pine, *Pinus strobus;* Scotch pine, *Pinus sylvestris;* and Norway spruce, *Picea excelsa,* collected in nine states.[4] Specimens from three states (Mass., Mich., and Pa.) sent to Mr. J. R. Malloch were very kindly determined by him as "apparently a new species." Comparison has been made with a specimen obtained by Barnes and it is definitely the same as the species described below. It also seems very probable that the *rufitarsis* (*polita*) of Graham and the *laticornis* of MacAloney are identical with the species herein treated.

Because of the economic significance of this fly, its interesting habits, and its relative abundance,[5] it well merits a name. The writer thus ventures to present a description. Holotype and allotype have been deposited in the Museum of the Boston Society of Natural History and paratypes will be deposited in the Museum of Comparative Zoology, Harvard University, Cambridge, Mass.

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[1] Graham, S. A. Biology and Control of the White Pine Weevil, *Pissodes Strobi* Peck. Cornell U. Ag. Ex. Stn. Bul., 449: p. 27. 1926.

[2] MacAloney, H. J. The White Pine Weevil Problem in the New England States. Papers presented at the Forest Protection Conference, Syracuse University: p. 42. 1926.

[3] Barnes, T. C. A personal communication. 1928.

[4] *Viz.,* Me., N. H., Vt., Mass., R. I., Ct., N. Y., Pa., Mich.

[5] The above phases will be discussed in a paper in process of preparation.

Lonchaea corticis n. sp.

Male. Length, exclusive of wings, 3.8 mm. (In allotype, length, exclusive of wings and ovipositor, 3.9 mm.)

Head dull black; frons dull black, without large irregular pits or a transverse depression; interfrontalia with a number of black, incurved hairs with no definite arrangement. Frons wide, about one-half as wide anteriorly as its length (in female, wider, almost as wide as long); upper frontal orbits blue-black, glossy, not microscopically strigose; ocellar region bronze-black. Frontal lunule bears several dark hairs. Face greyish, pruinose; oral margin produced into a ridge. Cheeks without strong bristles, anteriorly fringed with uniform dark hairs. Antennae dark brown at base to reddish brown, greyish or yellowish pruinose; the third segment reddish brown at base, dark brown on outer side, lighter brown on inside; third segment a little less than twice as long as its greatest width; arista regularly and very finely serrate with minute, uniformly short, apically pointing hairs.

Thorax and abdomen a dark steel blue; pteropleura bare; no hairs near the stigmatal bristle; scutellum greenish or bluish to bronze-black, margin fringed with a number of small black hairs; several fine hairs present between the apical pair of scutellar bristles, or just posterior to a line connecting these two bristles. Region at the base of the scutellum unicolorously a dark blue-black and not entirely ferruginous. Metanotum unicolorously dark blue-black, dull or pruinose for one-third to one-half of its width. Thoracic hair, in general, no longer than the abdominal hair.

Legs black; metatarsus, second and third tarsal joints light yellow, last two segments brownish-black; whole tarsus covered with stiff, short, minute black hairs.

Wings iridescent; nervures light brown. Squamae pale yellowish-white, with light yellowish-brown border and pale yellow fringe. Halteres black or nearly so.

Holotype a male which emerged June 1, 1928, from white pine shoots collected at Roslindale, Boston, Mass. Allotype: Same data.

General remarks about series: Size, exclusive of wings, ranges from 3.5 to 4 mm. Shape of abdomen may be elongate, oval, or almost round. The tip may be blunt but usually it is broadly tapered. The dark steel blue of the thorax and abdomen varies to a dark blue-black. The fine hairs between the apical pair of scutellar bristles may be one or more, usually two or four. Other fine hairs may be present on the dorsum of the scutellum. The apical pair of scutellar bristles may be asymmetrical in position or even reduced to but one bristle. The region at the base of the scutellum (postscutellum?) may show a ferruginous band of varying width but in no member of the series examined did this rust-colored band include the whole sclerite. The halteres vary from brown to black. No correlation between variations and localities was noted but this matter was not studied.

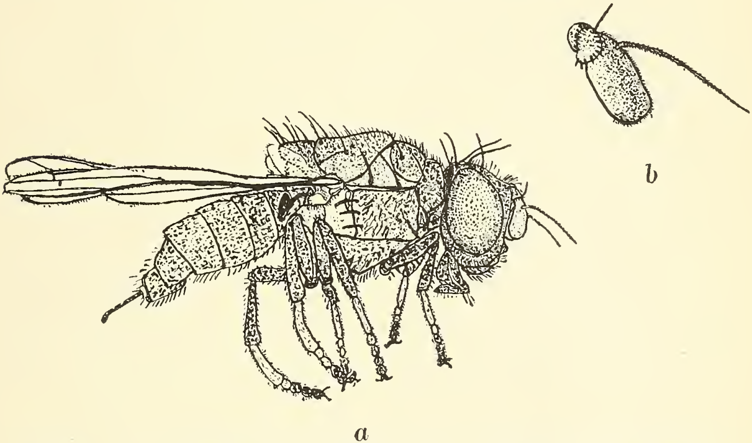

Fig. 1. a—*Lonchaea corticis* n. sp., female; b—antenna.

This species runs as far as couplet 18 in Malloch and McAtee's key[6] and departs therefrom since it possesses *both* of the divergent characters, *viz.,* "third antennal segment not or barely over twice as long as its greatest width" and "some minute hairs between the apical pair of scutellar bristles." A comparison with the published description of *L. watsoni,* a recently described species,[7] was made but this form seems excluded since it runs as far as couplet 23 in the above-mentioned key. It may be stated that this species, then, differs from all others preceding or following it in the key by possessing both of the characters quoted above.

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[6] Malloch, J. R., and McAtee, W. L. Keys to Flies of the Families Lonchaeidae, Pallopteridae, and Sapromyzidae of the Eastern United States, with a List of the Species of the District of Columbia Region. Proc. U. S. N. M., Vol. 65, Art. 12. 1925.

[7] Curran, C. Howard. Descriptions of New Canadian Diptera. Canad. Ent., Vol. 58, p. 213. 1926.

A comparison with a specimen of *laticornis,* determined by Malloch, in the Museum of the Boston Society of Natural History, was made. The species described above was close to *laticornis,* particularly as the species so labeled possessed some minute hairs between the apical pair of scutellar bristles, which is at variance with the key. The clear cut character which sets the holotype of *corticis* apart from the specimen of *laticornis* seen, is the condition of the region at the base of the scutellum. In *laticornis,* a ferruginous, pruinose band surrounds the scutellum basally; in *corticis,* the band is absent (or reduced). Although not too much reliance is placed in color characters, the following may be of aid: In *laticornis,* the thorax and abdomen are not unicolorous, the former is a dark steel blue, tinged with brassy, the latter a very light steel blue; the scutellum is conspicuously, unicolorously brassy. In *corticis,* the thorax and abdomen are about the same shade, and the color of both, in general, is darker than the thorax of *laticornis;* the scutellum is not conspicuously, unicolorously brassy as described above.

A comparison was also made with a specimen of *polita,* determined by Malloch, in the same collection. The immediately obvious separating character here is the third antennal joint, which is much longer than in *corticis.*

The flies were particularly abundant in material caged from the following additional localities: Augusta, Me.; Durham and Concord, N. H.; Bradford, Vt.; Milroy, Pa.; Oneonta, N. Y., and Roscommon, Mich.

BOOK NOTES.

Creation by Evolution.—A Consensus of Present-day Knowledge as Set Forth by Leading Authorities in Non-Technical Language That All May Understand, Edited by Frances Mason. pp. i–xx + 1–392, with figures and plates. 1928. (The Macmillan Company, New York. $5.)

Here we have a book of varied aspects, unified by its editor's two ideas—to show the reasonableness of the theory of evolution and its congruence with religious belief. The jacket tells us quite fairly "In this book a group of the most eminent scientists of Great Britain and America give facts about nature which they have discovered by original research, each in his own special field of study, and tell what their findings prove in regard to evolution. . . . While the contributors have written independently the evidence does not conflict; . . ."

Mrs. Mason, in her preface, says: "The revelation of creation by evolution which comes to us through science widens and exalts our outlook on life and our religious faith, and these papers have been assembled in the hope that they may lead to a more general understanding of Nature and Nature's Way."

The roster of authors is imposing, containing such names as those of Dr. Henry Fairfield Osborn, Dr. David Starr Jordan, Sir Arthur Shipley, Dr. E. B. Poulton, Julian Huxley, Dr. William Morton Wheeler, G. Elliott Smith, and all the others, whose mere naming is sufficient guarantee of their competency in the subjects about which they write. Each, naturally, presents his personal reaction to the ascertained facts and their interpretation.

In the foreword, Dr. Osborn says, speaking of the term "evolution," "No word in any language at the present time is so comprehensive as this; few words are so misunderstood."

To the ordinary, humdrum human being, "evolution" connotes progress, a steady ascent toward the ethereal heights of transcendent life and wisdom. To those that know, the word is but another term for the cosmic timeless flow of energy in its protean manifestations. The man in the street deifies evolution; the sage knows it to be but one attempt at understanding, of the many that have preceded it and of the multitudes to follow.

There can be no question that this is a mutable universe, a cosmic flux; nor can there be any question that the thing we call life itself is a pulsation. But once the authors soar from the firm field of facts to the empyrean of speculation, once they launch into the chartless seas of metaphysics and philosophy, their interpretations become individual and subjective, and plunge at once into the realms of simple faith. The undeniable fact of eternal change becomes the foundation of towering Fata Morganas of philosophy. Dr. Conklin's phrase "thinking wishly" then becomes as applicable to hard-and-fast advocates of the "dogma" of evolution, as to the meanest thrall of the ju-ju man. Scorn is cast upon "anthropomorphic" thinking, but how else can man think than in terms of his subjective self that interprets all things by his own consciousness and awareness of the external world—a consciousness and an awareness never identical from man to man; nor in the same man from hour to hour.

Basically, all the philosophies flowing from the purely materialistic interpretation of evolution lead to a blind chaos. It might seem as though many of the high priests of the "doctrine" might well contemplate the meaning of time and infinity in their mathematical and metaphysical implications. Then they would realize that there is no time—that all is "here and now;" and that infinity is made up of finites. Whether we progress or regress would then mean nothing to them or to any one else.

"Finer and nobler forms of life" are ecstatically foreshadowed —but according to whose criteria? Each organism, in its own peculiar environment, may be the finest and noblest for that environment. Who shall say?

Of entomological interest are the essays by Dr. Poulton on "Butterflies and Moths as Evidence of Evolution;" by Sir Arthur Shipley on "Evolution of the Bee and the Beehive;" by Dr. Wheeler, on "The Evolution of Ants." The discussion by Dr. J. W. Gregory on "The Nature of Species" is very important, for it shows, in fact, the instability and changeableness of what we are pleased to term "species" and the fluctuation of forms about a norm, which is termed a *circulus*. In fact, this, the fundamental essay in the book, on whose conclusions the whole depends, shows nothing so clearly as that at a static moment we may define a species, which in the flow of nature merges into another definable entity by imperceptible changes; a new entity that eventually replaces its vanished predecessor. Students of the Corixidae in the Heteroptera are confronted with this extreme plasticity of forms, which goes to make all taxonomic work in that group a study in osculating circles.

A general remark may be made to the effect that the essays which compose this book are susceptible of another and perhaps more logical arrangement, starting with the essay just cited and winding up with those of Drs. Jordan and Thomson.

This work is vastly interesting as showing subjective states of mind, and that each author has a thesis, to which his production is closely tied up. It is suggestive and interesting, but hardly final in any aspect. J. R. T. B.

PROCEEDINGS OF THE SOCIETY.

MEETING OF JANUARY 13, 1927.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum, Eastern Parkway, Brooklyn, N. Y., on Thursday evening, January 13, 1927, at 8.26 p. m.

President Davis in the chair and thirteen members present, *viz.:* Messrs. Anderson, Bell, Beutenmuller, Chapin, Doll, Engelhardt, Notman, Schaeffer, Schiffer, Siepmann, Sheridan, Torre-Bueno, Weeks, and one visitor, Mr. C. L. Pollard.

Minutes of the December meeting read and approved.

Mr. Engelhardt presented the annual report of the Treasurer and remarked that there were now 72 subscribers to Entomologica Americana, an increase of 15 during the past month; he also presented a comparison of the income account for the past six years and remarked on the steady and healthy growth which was shown, from an income of $1,185 in 1921, to $2,156 in 1926.

Mr. Weeks made a motion, which was seconded and approved, that the Society express its thanks to the Treasurer for the prosperous condition shown by the report.

Mr. Torre-Bueno presented the report of the Publication Committee. On motion of Mr. Weeks, duly seconded and approved, the Society extended its thanks to Mr. Torre-Bueno for the fine report.

Mr. Pollard expressed his pleasure at being present, and remarked that it was the first meeting of the Society which he had attended in 15 years.

Mr. Schaeffer proposed for membership Mr. Pinney Schiffer, 20 First Avenue, New York City.

Mr. Schiffer being present, Mr. Weeks moved that the By-Laws be suspended and that the Secretary cast one ballot for his election, duly seconded and carried. The Secretary then cast the ballot and Mr. Pinney was declared elected a member of the Society.

Mr. Engelhardt called the attention of the Society to the death of Mr. George Schoonhoven, son of Dr. J. J. Schoonhoven, a member of the Society, and made a few remarks about him. It was moved and seconded that Mr. Engelhardt write to Dr. Schoonhoven and express the regret of the Society. Mr. Engelhardt also called attention to the death of one of the subscribers to the BULLETIN, Mr. George J. Keller.

Mr. Sheridan reported for the Nomination Committee and persented the following names for officers of the Society for the ensuing year: President, Mr. W. T. Davis; Vice President, Mr. J. R. de la Torre-Bueno; Treasurer, Mr. George P. Engelhardt; Publication Committee, Mr. J. R. de la Torre-Bueno, Mr. George P. Engelhardt, Mr. Ernest L. Bell; Secretary, Mr. Ernest L. Bell; Corresponding Secretary, Mr. Howard Notman; Delegate to the Academy, Mr. George P. Engelhardt; Librarian, Mr. R. F. Hussey; Curator, Mr. A. C. Weeks.

As there were no further nominations, they were declared to be closed and on motion duly carried the Secretary was directed to cast one ballot for the election of those presented by the Nomination Committee, which was accordingly done.

Mr. Weeks showed some living Tenebrionid beetles (*Tribolium confusum*) which he had obtained from a box of oatmeal that had been gnawed open by a mouse. The beetles were turned over to Mr. Schaeffer.

Mr. Davis showed a specimen of *Carabus nemoralis* Müll. which he had found on the sidewalk, on Christmas day; the insect was dead when found, but in perfect condition. He showed a copy of the Proceedings of the Staten Island Association of Arts and Sciences, for May 1915, in which there was an account under the title of "A Beneficial Beetle Recently Found on Staten Island," written by himself, recording his capture on May 10, 1915, of the first specimen of this beetle on Staten Island, and said that it has now become an established species there.

Mr. Notman gave an account of his collecting trip by automobile through the States of Oregon and Washington in 1923. He told of his experiences collecting at various points in these two States, especially on Mt. Rainier, where he collected at an elevation of 5,000 to 6,000 feet and at Crater Lake, Oregon, at a somewhat higher elevation, where he found snow banks on August 4th, though beetles, flies and butterflies were abundant. He reported many interesting beetles which he found along the shores of the Rogue River and also along the Snake River from Baker, Oregon, to Boise, Idaho. He illustrated his remarks with a box containing many specimens taken on his trip, which were prepared with his usual exactness and care.

Mr. Notman's remarks were discussed by the members, especially by Mr. Engelhardt, who had visited many of the localities where Mr. Notman had collected.

On motion of Mr. Sheridan, duly carried, the Society expressed to Mr. Notman its appreciation of his scholarly address.

Mr. Engelhardt exhibited a lot of clear-winged moths (Aegeriidae) recently received from O. C. Poling and collected at Alpine, Texas, during the season of 1926. Two species were represented: *Synanthedon prosopis,* bred from galls on catsslow (Mesquite) and *Gaea palmi,* captured on the foodplant, a western composite, known as burro-bush. The larvae are borers in the heavier portions of the stalks. Both of these species heretofore have been turned up only occasionally in single specimens, but with their foodplants and habits known, it is now comparatively easy to collect them in numbers.

Adjourned at 10.05 p. m.

MEETING OF FEBRUARY 10, 1927.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum, on February 10, 1927, at 8.19 p. m.

President Davis in the chair and 12 members present, viz: Messrs. Bell, Beutenmuller, Chapin, Engelhardt, Huntington, Notman, Schaffer, Schiffer, Sheridan, Shoemaker, Siepmann, Torre-Bueno. Also three visitors; Mr. C. L. Pollard, the speaker of the evening, Mr. Ragot, and Mr. Chas. Lemmer.

Minutes of the meeting of January 13 were read and approved.

Mr. Engelhardt presented the Treasurer's report, showing income from the previous meeting to date, amounting to $357.10; he also remarked on the steady growth of subscribers to *Entomologica Americana.*

Mr. Torre-Bueno presented report of the Publication Committee, saying that in addition to the steady increase in subscribers to *Entomologica Americana,* several more had been secured for the BULLETIN; the galley-proof for the February number of the BULLETIN was in his hands and that No. 3 of *Entomologica Americana* was in the hands of the printer; he also mentioned several papers which he had on hand for future issues of *Entomologica Americana;* he also spoke generally on the problems of the editor.

Mr. Davis exhibited a box of insects, including cicadas, grasshoppers, hymenoptera and an ant-lion; he remarked briefly on them and called attention to three specimens of the lubber-grasshopper, two of which were collected by Mr. Bell in the vicinity of Mobile, Alabama, and one from the Florida peninsula, the Florida specimen was more yellowish than the Alabama specimens, one of which was very dark and the other one intermediate between it and the Florida specimen. Mr. Davis said that the Florida peninsula specimens were of a lighter or more yellowish color than those found on the continent. After the meeting Mr. Bell called his attention to the fact that the very dark form from Alabama was taken in the swampy areas, while the lighter form was taken in the dry pine woods and that Dr. van Aller had told him that still lighter ones were sometimes found in the woods.

Mr. Schaeffer showed a galley-proof of part of the Coleoptera section of the New York State List of Insects.

Mr. Pollard addressed the Society on "Color in Butterflies," illustrating his remarks with two boxes of specimens, showing a wide range of color; he also spoke of the care that should be used in placing pin labels on specimens and showed a T-shaped label for the specific designation to be attached to the pin of the specimen instead of being pinned in the drawer.

A general discussion followed Mr. Pollard's address.

Adjourned at 9.50 p. m.

Meeting of March 10, 1927.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum, on Thursday evening, March 10, 1927, at 8.21 p. m.

President Davis in the chair and 11 members present, also three visitors, including Mr. R. A. Leussler, of Omaha, Nebraska. The members present were as follows: Messrs. Anderson, Bell, Beutenmuller, Chapin, Engelhardt, Notman, Ragot, Schaeffer, Schiffer, Siepmann, Weeks.

Minutes of the previous meeting read and approved.

Mr. Engelhardt reported briefly for Mr. Torre-Bueno, the editor, who was not present.

Mr. Engelhardt proposed for membership Mr. Frederick Lemmer, 688 Nye Avenue, Irvington, New Jersey, and Mr. Bell proposed for membership Mr. C. L. Ragot, 2120 Barclay Street, Long Island City, New York.

Mr. Weeks made motion that the By-Laws be suspended and that the members proceed with the election of the two gentlemen proposed; duly seconded and carried. He then moved that the

Secretary be directed to cast one ballot for their election, which being duly seconded and carried, the Secretary thereupon cast the one ballot and Mr. Lemmer and Mr. Ragot were made members of the Society.

Mr. Engelhardt read a letter from Mr. John J. Schoonhoven acknowledging the Society's expression of regret in his son's death.

Mr. Engelhardt showed pupae of the Lycaenid *Feniseca tarquinius* Fabricius which he had collected among the leaves under black alders in the Botanical Gardens and remarked on the habits of the larvae and the appearance of the pupae; he also spoke of finding the pupae of one of the *Chrysopidae,* the lace-winged or golden-eye fly among the leaves of the black alder while looking for the pupae of *tarquinius,* and showed one adult specimen of the fly which had emerged in the jar containing the pupae of both of these species.

Mr. Davis showed samples of drawings of the genitalia of *Lachnosterna* by Mr. Sim; he also exhibited a box containing galls of *Amphibolips confluens* Harris, one of which was of peculiar shape and remarked upon them.

Mr. Beutenmuller spoke on "Collecting in North Carolina," relating his experiences collecting in the Black Mountain region several years ago, he showed several maps of the mountain ranges running from Virginia to Alabama, pointing out the general contour of the country where he collected; he showed many photographs, and water-color sketches made by Mrs. Beutenmuller, of the mountain scenery and places where he collected; he also exhibited a box containing specimens of Coleoptera collected by him in this region and many beautifully drawn pen and ink illustrations of North Carolina beetles, which were drawn by Mrs. Beutenmuller.

A general discussion of Mr. Beutenmuller's remarks followed.

Mr. Leussler spoke of Nebraska, saying that the lowest elevation in the State was in the southeastern part, where it was 1,000 feet above sea level, and the highest in the northwestern part, where the elevation is 6,000 feet, of the interesting sand-hill regions, the lakes and the canons with their historical interest connected with Indian battles of the past; the insect fauna of the State is of particular interest as there are found among the butterflies many species that are also taken in the east, south and Rocky Mountain regions.

Society adjourned at 10.15 p. m.

MEETING OF APRIL 14, 1927.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum, on Thursday evening, April 14, 1927, at 8.17 p. m.

President Davis in the chair and 12 members present, as follows: Messrs. Anderson, Bell, Beutenmuller, Chapin, Engelhardt, Huntington, McDevitt, Notman, Ragot, Sheridan, Siepmann, Torre-Bueno. Also two visitors, Mr. Pollard and Mr. Bridwell, and a reporter.

Minutes of previous meeting read and approved.

Mr. Engelhardt presented the Treasurer's report.

Mr. Torre-Bueno reported for the Publication Committee that the April BULLETIN was made up and in the hands of the publishers, and No. 4 of the *Entomologica Americana* galley-proofs was on hand; he also said that 21 new subscribers to the BULLETIN had been obtained since January 1st and that a few had been dropped.

Mr. Bell proposed for membership Mr. Lionel Lacey and Mr. Richard Lacey, both of 107 6th Avenue, Pelham, N. Y.

The proposals were held over until the next meeting in due course.

The Secretary read a letter from Mr. Roy Waldo Miner, Recording Secretary of the New York Academy of Sciences, with regard to the increased cost of publishing the Directory of the Academy and proposing that the affiliated societies bear one half of the cost and the Academy the other half, the pro rata share of each society to be based upon its membership as given in the Directory of 1924 over and above those members who are also members of the New York Academy of Sciences. Mr. Engelhardt moved that the Society accept the proposition as stated in the letter, duly seconded and carried.

Mr. Engelhardt proposed for Honorary Membership Mr. W. H. Nichols, Jr., and remarked on Mr. Nichols' generosity and of the great assistance he had been to the Society. Mr. Nichols was unanimously elected an Honorary Member.

Mr. Engelhardt then proposed Dr. L. O. Howard, United States Entomologist, for Honorary Membership, and he also was unanimously elected.

Mr. Davis called attention to newspaper reports of the forest fires raging on Long Island and spoke of their disastrous effect upon the vegetation and the insect and animal fauna of the regions burned over.

Mr. Engelhardt spoke of the large numbers of deer on Long Island, but said that introductions from other regions had almost completely replaced the original stock.

"*Factors underlying the abundance and scarcity of insects*" formed the subject of a conference freely discussed by all members present. Mr. Engelhardt, in opening the discussion, remarked that the terms "common" and "rare" so frequently used by collectors must be considered as arbitrary expressions indicating the ease or difficulty with which certain species may be collected, rather than bearing upon the actual status of insects, based on biological facts. An insect conspicuous because of size, color or habits may be designated as common, while another less conspicuous and of obscure habits may be regarded as rare, whereas in actual numbers it may exceed by far the supposedly common kind. Food unquestionably is the basic factor underlying the status of all insects.

In the scheme of nature all living organisms are subjected to a keen competition for existence. In this struggle with its complexity of interdependent relations insects are favored or retarded numerically in proportion to their powers of distribution, their adaptability regarding food and their resistance to climatic and weather conditions. As a result there may be seasons of abundance or of paucity, maintaining, however, under otherwise normal conditions an average which is popularly known as "the balance in nature."

Against this balance in nature, man's widespread activities are constantly at work. Agriculture, timber operations, city developments, routes of travel and above all his utter disregard of everything not of direct benefit to him are changing the aspect of the earth and the struggle for existence has come to a pass where adaptability to changed conditions is supreme and the lack of these qualities means doom. Innumerable examples to illustrate this assertion can be cited. What has become of the hordes of Rocky Mountain locusts that periodically devoured the farmers' crops in the West? Its natural breeding grounds on mountain meadows have been turned into pastures for cattle and sheep, and of the grasshoppers hardly enough are left to be sure of the identity of the species. In contrast may be mentioned the cotton boll weevil which, of little significance in its Central American home lands, found a table spread when it crossed the Mexican border into Texas and quickly adapted itself to the consumption of an unlimited supply of food.

Mr. Bridwell spoke of his experiences travelling in many parts of the world.

Mr. Anderson mentioned finding many parasitized pupae of *Cecropia,* but those found on bayberry were usually in sound condition.

Adjourned 10.45 p. m.

MEETING OF MAY 12, 1927.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on Thursday evening, May 12, 1927, at 8.15 p. m.

President Davis in the chair and 12 members present, as follows: Messrs. Beutenmuller, Chapin, Engelhardt, Lemmer, Ragot, Schaeffer, Schiffer, Sheridan, Shoemaker, Siepmann, Torre-Bueno, Weeks. Also one visitor, Mr. Pollard.

In the absence of Secretary Bell, Mr. Pollard was asked to serve as Acting Secretary.

Minutes of the last meeting were read and approved.

The Treasurer presented his report, which was accepted and ordered placed on file.

Mr. Torre-Bueno reported for the Publication Committee.

The names of Messrs. Lionel Lacey and Richard Lacey, of Pelham, N. Y., proposed for membership at the last meeting, were laid before the Society. Upon motion the Acting Secretary was directed to cast an affirmative ballot and this being done, both gentlemen were declared elected.

A letter was read from Dr. L. O. Howard expressing appreciation of his election to honorary membership in the Society.

Mr. Engelhardt exhibited a pamphlet prepared by Dr. W. J. Holland in commemoration of George A. Ehrmann, a former subscriber to the Society's publications. This is illustrated with photographs of Ehrmann's types in his collection, which is now in the Pittsburgh Museum.

Upon motion it was voted that the Society hold no further meetings until October.

Mr. Davis reported seeing a male *Papilio polyxenes* on Staten Island on May 1st, remarking that *P. turnus* is usually the first of the *Papilios* to appear. Mr. Ragot reported seeing both species in several localities during the first week in May.

Mr. Davis also exhibited a map of Long Island showing the distribution of various broods of the 17-year locust, *Magicicada septendecim.*

Mr. Beutenmuller, speaking upon the topic "The Bombycine moths found in the Black Mountains of North Carolina," exhibited and commented upon a number of specimens. The majority of species, he said, were northern forms, very few distinctively southern species appearing. He commented on the abundance of several, as *Haploa militaris* and *Utetheisa bella.*

Mr. Engelhardt exhibited a collection of inflated larvae made by the late Josef Mattes and recently purchased by the Brooklyn Museum. It includes about 1,500 specimens of some 200 species, mostly identified and all beautifully prepared. Mr. Engelhardt read a brief memorial which will be published in the BULLETIN. (See No. 4, vol. xxii).

Mr. Schaeffer spoke on "American Chrysomelidae." He exhibited and commented upon a number of species, stating that although only a few authors had worked upon this group, there had been considerable misidentification. The paper will be published in full in the BULLETIN.

Adjourned at 10.24 p. m.

CHARLES L. POLLARD,
Acting Secretary.

MEETING OF OCTOBER 13, 1927.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on Thursday evening, October 13, 1927, at 8.15 p. m.

President Davis in the chair and nine members present, as follows: Anderson, Chapin, Engelhardt, Lemmer, Schaeffer, Schiffer, Sheridan, Siepmann, Torre-Bueno. Also two visitors, Mr. C. L. Pollard and Mr. Geo. J. Rau.

In the absence of the Secretary, Mr. Pollard was appointed Acting Secretary.

Minutes of the last meeting were read and approved.

The Treasurer presented a report, which was accepted and ordered placed on file.

Mr. Torre-Bueno reported briefly for the Publication Committee, stating that Vol. VIII, No. 1 of *Entomologica Americana* had been distributed.

The Acting Secretary read a letter from Mr. W. H. Nichols, Jr., expressing appreciation of his election to honorary membership in the Society.

Mr. Engelhardt brought up the question of raising the subscription price of the Bulletin, stating that the Publication Committee, after due consideration, recommended an increase in the price to members from 75 cents to $1.50 and in the case of subscribers from $1.50 to $2.50. Mr. Torre-Bueno explained the reasons for the proposed charge. Upon motion, duly seconded, it was voted to refer the matter to the Publication Committee with power.

The President exhibited two recently published books, "Histological Technique," by Kingsbury and Johanssen, and "Guide to the Dragon Flies of Connecticut," by Dr. Philip Garman; also a number of picture post-cards received during the summer from various members.

The scientific program was then taken up and Mr. Davis showed a male specimen of *Mantis religiosa* taken by Mr. Ned J. Burns at Sands Point, August 31, 1927. This adds a Long Island station to the range of this insect, which has been gradually spreading since its introduction into Central New York. He also exhibited various specimens of Cicadas taken in the West by Mr. Engelhardt.

Mr. Sheridan mentioned the desirable collecting in Frost Valley, south of Slide Mountain in the Catskills.

Mr. Lemmer showed various moths taken at Lakehurst, N. J., with some inflated larvae. He stated that in sugaring for moths he had found the most successful bait to be slightly fermented apple sauce, with an admixture of cane molasses.

Mr. Chapin briefly described his experiences while collecting near Litchfield, Conn.

Mr. Engelhardt exhibited some of the so-called jumping beans from Mexico, which are really the seeds of an euphorbiaceous plant. The motion is caused by the larva of one of the Micro-Lepidoptera, *Carpocapsa saltitans.* He also gave an account of the aestivation of the larva of *Arachnis picta,* a Californian arctian moth. This account will be published in the Bulletin. Mr. Engelhardt further reported that he had observed the butterfly, *Catopsilia philea,* a species of the far south, at Asbury Park, N. J., in early September, stating that he had also seen it some years ago on Riverside Drive in New York City.

Mr. Schiffer remarked that he had found some interesting beetles in his collecting during the summer in this vicinity.

Mr. Siepmann said that he had collected extensively in Middlesex County, N. J., paying especial attention to the Chrysomelidae. Informal discussion followed, and at 10.15 p. m. the Society adjourned.

Charles L. Pollard,
Acting Secretary.

Meeting of November 10, 1927.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum, on Thursday evening, November 10, 1927, at 8.15 p. m.

President Davis in the chair and 12 members present: Messrs. Anderson, Bell, Chapin, Engelhardt, Huntington, Lemmer, Notman, Schaeffer, Schiffer, Sheridan, Siepmann and Torre-Bueno; also seven visitors, including Dr. W. T. M. Forbes, Mr. Franklin H. Chermok, of Pittsburg; Mr. Olmstead and Mr. Bridwell.

Minutes of the previous meeting were read and approved.

Mr. George P. Engelhardt presented the Treasurer's report.

Mr. Torre-Bueno reported briefly for the Publication Committee, commenting on the increase in the subscription price of the Bulletin from 75c to $1.50 to members and from $1.50 to $2.50 to non-members to become effective from next February.

Dr. W. T. M. Forbes made a few remarks, among other things saying that the New York State List was now reported in "page-proof" and would probably go to the printer by the end of the month.

Mr. Lemmer exhibited a box of moths collected at Lakehurst, N. J., containing finely mounted specimens of uncommon and rare species including:

Hemileuca maia Dru.
Catocala gerhardi B. & B.
Xylina nupera Lint.
Lycophotia occulta L.
Celama pustulata Wlk.
Illice subjecta Wlk.
Hypoprepia fucosa Hbn.
Catocala praedara G. & R.
Apantesis figurata Dru.
“ *figurata* form *lugubris* Hlst.
“ *placentia* A. & S.
Acronycta albarufa G. & L.
“ *connecta* G. & L.
“ *caesaria* Sm.
“ *tritona* Hbn.
“ *brumosa* Gn.
Oligia minuscula Morr.
Eupanychis spinosae Gn.
Apharetra dentata Grt.
Polia laudabilis Gn.
Eriopyga lindseyi Benj.
Epipsilia mono chromatea Morr.

Monodes festivoides Gn.
“ *grata* Hbn.
Fagitana littera Gn.
Phuphena u-album Gn.
Callopistria granitosa Gn.
Polygrammate hebraeicum Hbn.
Xylomyges alternans Wlk.
Agriopodes fallax H.–S.
Harrisimunna trisignata Wlk.
Agrotis violaris G. & R.
Eucoptocnemis fimbriaris Gn.
Eucoptocnemis fimbriaris form *sordida* Grt.
Morrisonia mucens Hbn.
Harpaglaea pastillicans Morr.
Allotria elonympha Hbn.
Perigea cupentia Cram.
Sideridis rubefacta Morr.
Luperina burgessi Morr.
Trochea mixta Grt.
Parastichtis ralla G. & R.
Xylotype capax G. & R.
Characoma nilotica Rogenh.
Stiriodes obtusa H.–S.
Connia orina form *calami* Harv.
Phurys bistrigata Hbn.
“ *herbarum* Gn.
Zale squamularis Dru.
“ *aeruginosa* Gn.
“ *coracias* Gn.
“ *cingulifera* Wlk.
“ *calycanthata* A. & S.
“ *minerea* Gn.
“ *lunifera* Hbn.
Heterocampa varia Wlk.
Olene aridensis Benj.

Mr. Notman reported on his automobile trip through the southwestern part of the country to the Pacific coast and return through Utah and Colorado; he traveled 13,000 miles and collected 11,500 specimens of insects, principally *Coleoptera;* he traveled through the flood area at New Orleans early in the season and came through Colorado just before the floods in that part of the country occurred in the late summer and early fall; with the exception of two days' rain in Louisiana he reported good weather for the entire trip, and no trouble with the car.

Mr. W. T. Davis exhibited cicadas collected by Mr. Notman during his trip and also a female *Melanoplus punctulatus* Scudder from near Richmond, Staten Island, which he had found several feet above the ground in a hazel bush, on October 15, 1927. This grasshopper is often found on pines, but is now a rare species on Staten Island.

Mr. Chapin made a few remarks on some unusual insects which he had collected at Litchfield, Connecticut, during the past summer and exhibited a section of the end of a chestnut pole containing the borings and pupal cases of some insect.

Mr. Bridwell remarked on his enjoyment in attending the meetings of the Society; he spoke of cutting cane at Bombay, India, in May, 1926, and said that this year a Longicorn had emerged in a section of the cane that he had brought home with him, it having been in the cane for over a year, before emergence; he also spoke of acetic ether as a relaxing agent.

Mr. Nelson made a few remarks on his work with the Horticultural Board; and Dr. Forbes spoke briefly on his trip to Surinam.

Under scientific discussion, Geo. P. Engelhardt and Ernest L. Bell related their experiences *Collecting in the Foothills of the Colorado Rockies,* illustrating their remarks with specimens.

Mr. Engelhardt briefly mentioned his field work during the summer in southwestern Texas, New Mexico, Arizona and California, followed by a week's stop-over at the little resort " Plainview," in the foothills of the mountains only about an hour's ride on the Moffat Railroad from Denver. Arriving on July 5, he found his friends, Mr. and Mrs. Bell, already snugly housed in one of the cosy bungalows in a pine grove and on the best of terms with the friendly people who make life in this camp so attractive. Collecting trips were planned immediately, some starting at the very door of the bungalows, among the profusion of varied colored flowers, rendered especially luxuriant by ample rainfalls earlier in the season. Below the pine-clad hills unfold the vast expanse of open, rolling, prairie dotted with numerous ponds glistening in the sun and just one dark band indicating the wooded course of Coal Creek meandering eastward. The old hunting ground of Buffalo Bill, who has found his last resting place on Lookout Mountain above the town of Golden, ten miles away, is now the grazing ground of herds of cattle. At night, when gathered around the collecting lamp, the deep blue, star-studed sky would meet in the distance a sea of glimmering lights, indicating the location of Denver.

Back of the camp steep cattle trails zigzag upward to rocky peaks with 7,000 and 8,000 feet elevation and beyond these spreads out the wonderful panorama of the crest of the Rockies with snow fields and glaciers. Each region, it was found, held interests of its own. Some of the butterflies, as for example the abundant *Parnassius, Melittaea* and *Argynnis,* were encountered almost everywhere, but others had their well-defined zones according to the environment and the elevation. Collecting was pursued from the plain level to above the timberline at Corona, altitude 13,000 feet. The latter place is easily accessible by means of the Moffat Railroad, which, pending the completion of a tunnel at 9,000 feet, still climbs over the top of the crest and down the western slope. About forty tunnels and enormous snow sheds are passed through on this trip.

Mr. Engelhardt exhibited several boxes of butterflies, moths and beetles, selected primarily to illustrate the range of species in the various zones.

Mr. Bell exhibited a box containing specimens of the Hesperiidae collected, together with specimens of some of the species collected locally, for comparison, and remarked on the distribution generally; he also remarked on the richness of the butterfly fauna of this region, showing a list of 82 species, two forms and an aberration collected in the ten days he spent there.

Mr. Huntington showed and explained the Lycaenids collected and turned over to him by Mr. Bell. Mr. Schaeffer remarked upon the fine collection of Coleoptera, mostly due to Mr. Bell's efforts. While not likely to include new forms, it surely will extend the range of many species. Mr. Ernest J. Oslar, the veteran collector of Denver, Colo., joined Mr. Engelhardt and Mr. Bell during part of their stay at Plainview.

Among the moths exhibited by Mr. Lemmer was *Characoma nilotica* Rogenh., a species described from Egypt according to Dr. Forbes and found by him in Surinam. Mr. Lemmer's specimen was taken at Lakehurst, N. J., on August 22, 1926.

Society adjourned at 10.20 p. m.

Meeting of December 15, 1927.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum, on Thursday evening, December 15, 1927, at 8.30 p. m.

President Davis in the Chair and 14 members present, *viz.:* Messrs. Anderson, Bell, Beutenmuller, Chapin, Engelhardt, Lacy, Lemmer, Nelson, Notman, Schaeffer, Schiffer, Schott, Sheridan. Siepmann, Torre-Bueno, and four visitors, Mr. and Mrs. W. J. Willis and Mr. George Rau and his father.

Minutes of the previous meeting read and approved.

Treasurer reported that a detailed report would be made at the January meeting.

The Publication Committee also reported to the same effect.

Secretary read a letter of the New Academy of Sciences, calling attention to the annual dinner of the Academy to be held at the Biltmore on the evening of December 19; he also turned over to the Society the copy, received by him, for the Society, of " Biological Survey of the Mt. Desert Region," by Johnson, which was sent with the compliments of Mr. William Proctor; the members duly authorized this copy to be turned over to the Library of the Brooklyn Museum.

Mr. Engelhardt read a letter from Mr. Jacob Doll in which he presented his resignation from the Society; the members unanimously voted not to accept the resignation and in view of Mr. Doll's many years of association with the Society, also unanimously, elected him to Honorary Membership in the Society, and the Secretary was directed to notify him of this action.

Mr. Engelhardt called attention to the death of Mr. A. C. Weeks, on November 14, after a few days' illness, and spoke of his long association with the Society, having been one of the original members, and of his activities as a collector. Mr. Engelhardt and Mr. Schaeffer attended the funeral at Yaphank and sent a floral piece from the Society; he also read a copy of his letter to the son of Mr. Weeks, as follows:

" Mr. Henry C. Weeks,
East Orange, N. J.

Dear Mr. Weeks:

The Brooklyn Entomological Society, at its meeting on December 15, 1927, learned with deep regret of the death of your father.

The following motion, unanimously carried, has been recorded in the minutes of the Society:

That in the death of Archibald C. Weeks, on November 14, 1927, the Brooklyn Entomological Society has sustained the loss of one of its most active and helpful members, whose indefatigable services preceding and following the incorporation of the Society in 1885 have done so much to establish its standing as a leader in its field of science in America.

It was further moved that the Society express its sorrow and sympathy to the bereaved family of Mr. Weeks.

Very sincerely,
GEO. P. ENGELHARDT."

Mr. Engelhardt also spoke of Mr. Weeks' large collection of insects, mostly from Long Island, and hoped that the Brooklyn Museum would be able to obtain the collection.

Mr. Torre-Bueno reported that Dr. Leonard had asked for a list of the members of the Society in order that a copy of the New York State list of insects might be sent to them.

Mr. Davis exhibited a specimen of the dobson, or hellgramite, *Corydalis cornuta* Linné, collected by Mr. Frank A. Rydstrom, on the screen of a bungalow porch, at Cedar Beach, New Dorp, Staten Island, on July 9, 1926, and said that it was the only one he ever saw from Staten Island.

Mr. Nelson spoke on the *Problems of the Horticultural Board,* as follows:

The Federal Horticultural Board guards this country against all incoming insect pests and plant diseases, policing the principal ports of entry and the Mexican border. Its problems are to determine what fruits and vegetables can be allowed entry and when to prohibit certain others because they are found to be infested with an insect pest or plant disease that would be dangerous to our own products. Grapes shipped from Argentine are permitted from only two districts and incoming shipments must be certified as to their origin from these two districts. Narcissus bulbs from Holland must be sterilized in water at 110° for 2½ hours. This treatment does not injure the bulbs but kills the larvae of the greater and the lesser bulb flies which infest the bulbs and would do great damage if allowed to become established in the United States. The Italian chestnuts must be sterilized in water at 122° for 45 minutes, because they are infested with larvae of the European codling moth and the chestnut weevil.

The Japanese beetle is a good example of a foreign pest that was brought into the United States unawares and is causing great loss. The gipsy and brown-tail moths are two others that have spread considerably since their introduction into New England causing great damage.

The chestnut-bark disease was brought from Asia and by 1912 had killed the native chestnut trees in New York State and parts of Pennsylvania. At present it has reached Virginia, killing practically all our native chestnuts.

In 1915, the citrus canker was threatening the citrus industry of Florida and the Gulf states. By quick action the Federal Government, coöperating with the various states, located and destroyed all infected trees. This is a contagious disease and great care had to be taken while inspecting for it. The inspectors wore a suit similar to coveralls and when a grove had been inspected this suit was dipped in bichlorid of mercury, as were the shoes and hands. Infected trees were destroyed by burning them while growing. This was accomplished by spraying a mixture of 50 per cent. kerosene and 50 per cent. crude oil. The mixture was ignited while being sprayed on the tree. This very hot but concentrated flame soon destroyed any diseased tree.

In 1916, word was received that two plantations in Texas had received Egyptian cotton plants. These might be infested with the pink boll worm, which, if once established in this country, would be more dangerous than the boll-weevil. Inspectors were rushed out to the plantations from New Orleans. The boll worm was found in several bolls. The entire plantations with infested plants were destroyed. After the plants had been dug up and placed in one pile a gang of negroes followed along the rows and picked up every leaf or scrap of plant and burned them with the plants, so that the area formerly covered with cotton plants was now absolutely free of any trace of cotton and the boll-worm could not possibly live there.

By inspecting all incoming cargoes, passengers' baggage and packages sent by parcels post, the Federal Horticultural Board can protect the agricultural interests of the country.

The members discussed Mr. Nelson's remarks, and Mr. Sheridan moved that the members express a vote of thanks to Mr. Nelson for his interesting talk, which was acocrdingly done.

Mr. Engelhardt exhibited his collection of clear-wing moths (family Aegeriidae) of the genus *Alcatho*. All the members of this family in the larval stages are borers in the roots, stalks or solid wood of plants, shrubs and trees. When the habits and food plants are known it is not difficult, in most cases, to secure cuttings, preferably containing pupae, and to breed the insects. In this way it is possible to obtain fine series of species hardly ever taken by chance collecting. The genus *Alcatho,* Mr. Engelhardt remarked, will serve to illustrate a case in hand. Up to a year ago only three species, two east and one west of the Mississippi, were known north of Mexico. Breeding experiments during the past summer added a new species from California, another from the western slope of the Rockies of Colorado and a sub-species from Ohio. Further additions are expected from Texas and elsewhere.

Investigations of this kind promise to establish on a sound basis the true status of all the members of the genus in North America.

Adjourned at 10.13 p. m.

MEETING OF JANUARY 12, 1928.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum, on Thursday evening, January 12, 1928, at 8.18 p. m.

President Davis in the Chair and 14 members present, *viz.:* Messrs. Anderson, Bell, Beutenmuller, Bromley, Chapin, Engelhardt, Lemmer, Notman, Schaeffer, Schiffer, Sheridan, Shoemaker, Siepmann and Torre-Bueno, also three visitors.

Minutes of the previous meeting read and approved.

Mr. Engelhardt presented the report of the Treasurer, and briefly remarked on the very favorable condition of the Society's finances; he also reported that the new subscribers to the Society's publications outnumbered those lost through various causes.

Mr. Davis conveyed the thanks of the Society to both Mr. Engelhardt and Mr. Torre-Bueno for the excellent financial condition of the Society, which was largely due to their efforts.

Mr. Torre-Bueno will report for the Publication Committee at the February meeting.

Mr. Sheridan, as Chairman of the Nominating Committee, presented the following nominations for the ensuing year:

For President, Mr. W. T. Davis; Vice-President, Mr. J. R. de la Torre-Bueno; Treasurer, Mr. G. P. Engelhardt; Recording Secretary, Mr. E. L. Bell; Corresponding Secretary, Mr. Howard Notman; Delegate to the Academy, Mr. G. P. Engelhardt; Editor, Mr. J. R. de la Torre-Bueno; Curator, Mr. F. M. Schott; Librarian, Dr. Joseph Bequaert; Publication Committee: Mr. G. P. Engelhardt, Mr. J. R. de la Torre-Bueno and Mr. E. L. Bell.

As no further nominations were presented, it was moved and seconded that the nominations be closed and the Secretary cast one ballot in favor of those presented by the Nomination Committee, which was accordingly done, and they were declared elected.

Mr. Torre-Bueno proposed for membership: Mr. S. W. Bromley, c/o American Cyanamid Sales Co., 535 Fifth Avenue, New York City.

As Mr. Bromley was present, Mr. Engelhardt moved that the By-Laws be suspended and the Secretary cast one ballot in favor of the election of Mr. Bromley, which was duly seconded and carried, and the ballot cast by the Secretary.

Secretary read letters of Mr. Jacob Doll and the New York Academy of Sciences.

Mr. Engelhardt conveyed to the Society a message of greeting from Mr. Charles J. Martin, a member of the Society, now 90 years of age, who once was active in the meetings of the Society but now cannot attend due to his failing eyesight and advanced age; Mr. Martin is planning to go to Germany this year and to spend the rest of his life in that country; Mr. Engelhardt spoke of Mr. Martin's pleasing personality and his great interest in the Society and suggested that he be elected to Honorary Membership; it was thereupon duly moved and seconded, and unanimously approved, that Mr. Martin be elected an Honorary Member of the Society; Mr. Engelhardt said that he would advise Mr. Martin of the action of the Society.

Mr. Davis, under the title *Seventeen-Year Cicada Broods on Long Island in 1927,* remarked on the occurrence of the cicadas at localities on Long Island and exhibited maps with the points of occurrence designated in color, together with specimens of the adults and the pupal skins. Mr. Davis's remarks were discussed by the members.

Mr. Engelhardt, under the title *From South West Texas to the Carlsbad Caverns in New Mexico,* gave a very interesting account of his experiences while collecting clear-wing moths and other insects over the territory referred to, and exhibited several boxes of his captures. Mr. Engelhardt's paper will be printed in full in the BULLETIN.

Adjourned at 11.00 p. m.

E. L. BELL,
Secretary.

EXCHANGES.

This one page is intended only for wants and exchanges, not for advertisements of articles for sale. Notices not exceeding THREE lines free to subscribers. Over lines charged for at 15 cents per line per insertion.

Old notices will be discontinued as space for new ones is needed.

WE WISH to procure in exchange or on cash: *Parnassius of North-America,* with its varieties and aberrations, well labelled, spread or in papers (clodius, smitheus, eversmanni). Dr. Staudinger & A. Bang-Haas, Dresden-Blasewitz.

THE MUSEUM of the Brooklyn Institute has a few uncolored sets of the Calverly, Weidenmeyer and Edwards plates of North American Sphingidae for exchange or for sale at $5 per set. Address, Librarian, Brooklyn Museum, Eastern Parkway, Brooklyn, N. Y.

LEPIDOPTERA from the Mountains of Kentucky. Papilios and other var. of this section collected. Paper spec. of *Xylophanes tersa* and *Catopsilia eubule* on hand. Also Cocoons of the larger Saturnid moths. Ellis Chandlee, Barbourville, Ky.

BUTTERFLY COLLECTORS.—Have you aberrations or freak butterfly specimens for sale or exchange? Professional and private collectors please write. Jeane Gunder, Pasadena, Calif.

CYNIPIDAE.—Galls and bred wasps wanted to determine or in exchange. Alfred C. Kinsey, Indiana University, Bloomington, Indiana.

WANTED.—Am studying the bionomics of the corn billbugs and desire the privilege of examining *Calendra* (*Sphenophorus*) from all parts of the world. A. F. Satterthwait, U. S. Entomological Laboratory, Webster Grove, Mo.

DIURNAL LEPIDOPTERA.—Have many desirable western species to exchange, including *Argynnis atossa, macaria, mormonia, malcolmi, nokomis; Melitaea neumoegeni; Lycaena speciosa;* etc. Send lists. Dr. John A. Comstock, Southwest Museum, 4699 Marmion Way, Los Angeles, Calif.

WANTED.—Ants from all portions of the United States for determination or exchange. Will also exchange other insects for ants. M. R. Smith, Assistant Entomologist, State Plant Board, A. and M. College, Miss.

CATOPINI: *Catops* (*Choleva*), *Prionochaeta, Ptomaphagus.* —Wanted to borrow all possible specimens of these genera from North America for a revisional study. Correspondence solicited. —Melville H. Hatch, Dept. of Zoology, Univ. of Wash., Seattle, Wash.

COLEOPTERA wanted.—Will collect insects of any order in exchange for Silphidae, Scarabaeidae and Cerambycidae. P. Schiffer, 20 First Avenue, New York City.

Vol. XXIII DECEMBER, 1928 No. 5

BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

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FEB 7 - 1929
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PUBLICATION COMMITTEE
J. R. de la TORRE-BUENO, Editor
E. L. BELL GEO. P. ENGELHARDT

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The Brooklyn Entomological Society

Meetings are held on the second Thursday after the first Tuesday of each month from October to June, inclusive, at the Central Museum, Eastern Parkway and Washington Ave., Brooklyn. The annual dues are $2.00.

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BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

Vol. XXIII December, 1928 No. 5

STUDIES ON DYTISCIDAE.

By Melville H. Hatch,[1] Seattle, Wash.

The accompanying keys, descriptions of new species, and notes have been drawn up in the course of the preparation of a synopsis of the Dytiscidae of western Washington. The types of the new species, except where otherwise noted, are in the collection of the author.

Key to Nearctic Species of Bidessus Sharp.

The following key is founded largely on the monographs of Crotch (Tr. Am. Ent. Soc. IV, 1873, p. 388–389) and Sharp (Tr. Royal Dublin Soc. (2) II, 1882, p. 344–369), the key to the *pictodes* group by Fall (Jr. N. Y. Ent. Soc. XXV, 1917, p. 167) and the key to the Florida species by Leng and Mutchler (Bull. Am. Mus. Nat. Hist. XXXVIII, 1918, p. 82–83). The author has seen so few (about one fourth) of the Nearctic species of this genus that, perhaps, he should have hesitated to present a review of them. If, however, the present tabulation is regarded primarily as a summary and index to the literature, it may be of value to students attempting determinations in this genus. The size of all the species is between 1.3 and 2 mm.

A¹. Eytral plica elevated on disc of elytra,
sub. Anodontochilus Reg.
  B¹. Broader; without pubescence; the elytral carina extending beyond middle; Fla., Ga. ....*exiguus* Aubé
  B². Narrower; with inconspicuous pubescence; the elytral carina not extending to middle; Cal...*plicipennis* Crotch
A². Elytral plica not elevated on disc of elytra,
subg. Bidessus s. str.

---

[1] Contribution from the Zoological Laboratory of the University of Washington.

B¹. Elytra with sutural stria.
  C¹. Broadly ovate; elytra with a subbasal and subapical spot.
    D¹. Punctures not appreciably finer between stria and suture; elytral spots larger; Cal....*pictodes* Sharp
    D². Punctures finer between stria and suture; elytral spots smaller; Ariz...............*decoratus* Fall
  C². Oblong.
    D¹. Elytra with subbasal and subapical spots.
      E¹. Sutural stria faint; elytra evidently and closely punctate; Cal..................*cinctellus* Lec.
      E². Sutural stria evident; punctures not appreciably finer between stria and suture; pubescence distinct; punctation fine; Cal.........*subtilis* Lec.
    D². Elytra with antemedian, postmedian, and apical pale spots; elytral plica longer than thoracic; sutural stria distinct; punctures finer between stria and suture; subglabrous; elytral punctures coarser than in *subtilis;* Ore., Wash...........*ornatellus* Fall
B². Elytra without sutural stria.
  C¹. Basal thoracic plica continued on elytra.[1]
    D¹. Elytra without evidence of a dorsal stria or series of punctures.
      E¹. Elytral portion of plica distinctly longer than thoracic portion.
        F¹. Ovate; elytra coarsely and distinctly punctate, not blackish at base; indistinctly pubescent; N. Y., Fla., ? Mich..........*granarius* Aubé
        F². Less broadly ovate; elytra more finely punctate, blackish at base; very finely and feebly pubescent; N. Y., Pa.............*suburbanus* Fall
        F³. Elongate oval; elytra finely and indistinctly punctate; finely pubescent; N. Y. and Mich. to Tex. and Fla..................*lacustris* Say

---

[1] The following species, likewise, probably belong here:

B. amandus Lec., Ariz. Oblong; elytra finely punctate, finely pubescent; without sutural stria.

B. texanus Sharp, Tex. Oblong oval; finely pubescent; elytra finely punctate; without sutural stria.

B. obesus Sharp, Tex. Broadly oval; finely pubescent; elytra finely punctate; metacoxal plates strongly punctate.

According to Sharp the following Nearctic species of *Bidessus* s. str. have the metacoxae not longer than broad: *cinctellus* Lec., *pictodes* Shp., *flavicollis* Lec., *obesus* Shp., *discretus* Shp. The remaining species known to Sharp had the metacoxae longer than broad.

E². Elytral portion of plica subequal to thoracic portion.
  F¹. Elytra not or very finely pubescent.
    G¹. Broadly ovate; elytra with subbasal and subapical spots; Cal...... *quadripustulatus* Fall
    G². More elongate.
      H¹. Elytra finely punctate.
        I¹. Elytral punctures not aciculate; North and South America .... *affinis* Say
          J¹. Fuscous brown frequently with elongate pale markings.
            K¹. Dorsum not microreticulate, *typical form*
            K². Dorsum microreticulate; Mich. Wash., var. **microreticulatus** nov.[2]
          J². Black; Cal. (*nigrinus* Csy.) var. *obscurellus* Lec.
          J³. Dorsum predominantly pale.
            K¹. Venter black; dorsum with elongate black markings; Sitka, var. *erythrostomus* Mann.
            K². Venter pale; Ariz. var. *macularis* Lec.
        I². Elytral punctures aciculate; elytra often with purplish iridescence; Fla., *subsericeus* Blatch.
      H². Elytra more coarsely punctate.
        I¹. Elytra brown or piceous without pale markings.
          J¹. Punctures more closely placed and slightly finer; coxal plates with a few fine punctures; abdomen with some coarser punctures towards base; Fla. (*floridanus* Leng and Mutch. nec Fall) .... *longovalis* Blatch.
          J². Punctures more distant and slightly larger; coxal plates with coarse punctures; first and second abdominal sternites coarsely sparsely punctate; N. Y. and Mich. to Fla., *fuscatus* Crotch
        I². Elytra fuscous with broad subbasal band and variable narrow subapical pale

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[2] Type: Seattle, Wash., June 26, 1928. Paratypes: Washtenaw Co., Mich. VII–30–1921. M. H. Hatch. 1287t. Friday Harbor, Wash., Aug. 13, 1926.

spot; elytra and coxal plates strongly punctate; Tex. . . . . *discretus* Sharp

F^2. Elytra distinctly pubescent with longer yellowish hairs behind middle and near the apex; N. Y. and Ind. to Fla. and La. . . . . *pulicarius* Aubé

E^3. Elytral portion of plica shorter than thoracic; elytra finely punctate, finely pubescent; Fla. (*shermani* Mutch.) . . . . *floridanus* Fall

D^2. Elytra with an indistinct dorsal stria or series of punctures extending about half the length of the elytra; Mex., La. *pullus* Lec.

C^2. Basal thoracic plica not continuous on elytra.

D^1. Elytra black with pale margin and apex or black with pale margin, apex and basal postmedian fascia; N. Y. and Wisc. to Ind. and Miss. . . *flavicollis* Lec.

D^2. Elytra rufo-testaceous; Fla. . . . . *seminulum* Lec.

Coelambus (*s. str.*) *lutescens* Lec.

Of this species, recorded previously only from California, I have a single specimen from Pendleton, Ore., collected by Mr. J. S. Brode.

Hydroporus (*Oreodytes*) *yukonensis* Fall (Pan-P. Ent. II, 1926, p. 138, 141).

Three males and one female of this species in my collection from Yukon Crossing, Y. T. (J. M. Jessup collector) have the femora varying from pale to infuscate so that Fall's key (p. 141) must be modified in this respect for this species.

Hydroporus (Oreodytes) rainieri sp. n.

Length 4.5 mm., width 2.4 mm. Dorsum coarsely punctate, microreticulate, the microreticulation of the elytra somewhat coarser and less distinct; color above yellow marked with black as follows: a triangular spot mesad of either eye fusing with each other and with a narrow marginal basal band; narrow apical and basal margins of pronotum and two transverse discal fasciae, the posterior one more or less interrupted at the middle; about eight vittae and a humeral spot on elytron, the outer two vittae more or less interrupted and confluent. Pronotum 93–94% as wide at base as is elytra from humeral angle to humeral angle, the sides straight and very slightly convergent for about basal half, thence feebly arcuate to the anterior angles. Elytra with humeri feebly distinct, sides of elytra parallel in front of middle, thence convergent to the subacute apex; ♀ with apex obliquely truncate, the other angle obtuse, the margin of the elytra just anterior to angulation sinuate; ♂ with truncation, angulation, and sinuation evanescent; apices of elytra not dehiscent. Antennae pale, infusate towards apex. Legs pale, infuscate towards base. Venter black, densely microreticulate, set with larger punctures. Apex of ♀ last abdominal sternite with a bilobed lobe, in ventral aspect apparently notched at middle of apex, about half as long as wide. ♂ protarsi not wider than in ♀. Type ♀: Mt. Rainier, Wash. White R. Camp. V–19–1928. T. Kincaid. Three paratypes: ♂ same data as type. One paratype ♂: King Co., Wash. White R., Slippery Creek. Aug. 27, 1927. M. H. Hatch. Two paratypes ♂: Canyon Park (Bothell), Wash., Oct. 15, 1928.

Runs to *alaskanus* in Fall's key (Pan–P. Ent. II, 1926, p. 141), but separated therefrom by the bilobed lobe on the last abdominal sternite of the female and the wider ♂ protarsi.

Hydroporus (Oreodytes) kincaidi sp. n.

Length 4.9 mm., width 2.5 mm. Similar to *rainieri* except as follows: Sides of pronotum arcuate for apical third, thence nearly straight, towards the hind angles slightly sinuate and divergent so that the pronotum is as wide at the base as the elytra. Truncation, external angulation, and sinuation of ♀ elytral apex developed about as in ♂ of *rainieri,* the ♂ without evidence of any of these features except an extremely evanescent sinuation. The lobe of the last abdominal sternite of the ♀ is feebly bilobed as seen in ventral aspect but not notched at the middle. Type ♀ and paratype ♂ same data as type of *rainieri.*

Runs to *yukonensis* in Fall's key (l. c.) but separated therefrom by its larger size, the more abruptly divergent posterior pronotal angles, the base of the pronotum more nearly equaling in width the base of the elytra, by the feebly developed characters of the ♀ elytral apex, the presence of a lobe at the apex of the last abdominal sternite in the ♀.

Hydroporus (*Oreodytes*) *recticolis* Fall (l. c., p. 140).

I have a ♂ and ♀ of this species from Yukon Crossing, Y. T. (J. M. Jessup collector.) It was described from the Kenai Peninsula, Alaska.

Hydroporus (Oreodytes) obesus var. **angustior** nov.

Length 2.8 mm.; width 1.5 mm. Elytra with scattered punctures. Narrower than var. *congruus* (2.7x1.7 mm.), which is without scattered punctures and is in its turn said to be narrower than *obesus* Lec., which is unknown to me. *Obesus* has scattered punctures on the elytra. Type: Renton, Wash. 5–31–813. Two paratypes: Seattle, Wash., and Big Beef Cr., Wash. Sept. 18, 1928.

Agabus (*Gaurodytes*) *arcticus* Payk. Three ♂'s and three ♀'s from Yukon Crossing, Y. T. This species is probably circumpolar, as it is recorded from Labrador, arctic Europe, arctic Siberia.

KEY TO NEARCTIC SPECIES OF RHANTUS LAC.

The following species are included on the basis of published descriptions: *flavogriseus* Cr., *confusus* Blatch., *sinuatus* Lec.

A¹. ♂ intermediate claws unequal
  B¹. Posterior angles of pronotum not prolonged
    C¹. Front with transverse bilobed spot; metasternum black
      D¹. Disc of pronotum bimaculate, rarely with a single bilobed spot or immaculate
        E¹. Metafemur pale or feebly clouded with piceous
          F¹. ♂ outer anterior claw sinuate, inner claw straight
            G¹. ♂ outer hind claw 1/3 length of inner, ♂ inner intermediate claw 3/4 length of outer, ♂ inner front claw 2/3 length of outer; prosternum pale; abdominal sternites pale at sides only; length 10 mm.; Mexico. *maculicollis* Aubé
            G². ♂ outer hind claw 1/2 length of inner; ♂ inner anterior claw 9/10 length of outer
              H¹. Prosternum pale; ♂ inner intermediate claw 3/5 length of outer
                I¹. Elytra solid black except for apical seventh and lateral, basal, and scutellar margins; length 10 mm.; Mexico, Okla. *mexicanus* Cast.
                I². Elytra thinly irrorate with black; length 10 mm.; Okla. .... **hubbelli** sp. nov.
              H². Prosternum blackish at sides with carina and anterior margin pale; ♂ inner intermediate claw 4/5 length of outer; elytra fulvous, irrorate with black; length 9.5–11.5 mm.; Cal. to B. C. .... *longipes* Sharp.
          F². ♂ interior claws both sinuate; the inner 9/10 the length of the outer; ♂ inner intermediate claw 3/5 length of outer; ♂ outer hind claw 1/3

length of inner; prosternum pale; abdominal sternites pale only at sides or (ab. *plebeius* Shp.) with entire transverse pale markings; disc of pronotum bimaculate or (ab. **immaculatus** nov.,[3] Kodiak, Alaska) immaculate; length 10 mm.; Can. and N. J. to Kans., N. M., and Wash. .... *binotatus* Harr.

E². Metafemur black or with apical margin narrowly pale

F¹. Prosternum black with pale carina; ♂ anterior claws both sinuate

G¹. ♂ anterior inner claw 5/6 length of outer; ♂ intermediate inner claw 1/2 length of outer; ♂ hind outer claw 1/3 length of inner; length 10 mm.; Cal., Col. Id. ...... *divisus* Aubé

G². ♂ anterior claws subequal; ♂ intermediate inner claw rudimentary; length 10 mm.; Cal., *flavogriseus* Cr.

F². Prosternum black; ♂ anterior claws not sinuate, inner 2/3 length of outer; ♂ intermediate inner claw more than 1/2 length of outer; ♂ hind outer claw 2/5 length of inner; the pronotal spots frequently semi-confluent; length 11–11.5 mm.; Cal., Wash. .... *anisonychus* Cr.

D². Disc of pronotum with single transverse spot, not bilobed; ♂ outer hind claw 2/5 length of inner; ♂ anterior claws sinuate, inner 5/9 length of outer; ♂ inner intermediate claw 2/3 length of outer; femora and prosternum pale; length 9–10 mm.; Palaearctic, Yukon Terr., Alta., B. C., Kans., *notatus* F.

D³. Disc of pronotum immaculate, anterior and posterior margins medially transversely dark; ♂ outer hind claw 3/7 length of inner; ♂ inner intermediate claw 4/5 length of outer; ♂ anterior claws subequal, not or feebly sinuate; length 10–10.5 mm.; Palaearctic; Labrador and Alaska to Conn., Ind. and Wash. .... *bistriatus* Bergst.

C². Front black, immaculate; pronotum testaceous, disk bimaculate to immaculate; meso- and metasternum black to testaceous; ♂ anterior claws elongate, feebly sinuate, inner 5/6 length of outer; ♂ inner intermediate claw 5/7 to 5/8 length of inner; ♂ outer claw 2/5 length of inner; ♀ with elytra except along suture and at apical third densely and coarsely marked with a system of anastomosing impressed lines; length 10.5–11 mm.; N. Y., Mich., Alta., Wash. to Cal. (*tostus* Lec., ♀ *discedens* Shp.), *consimilis* Mots.

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[3] Type ♂ and allotype ♀ in collection of the Museum of the California Academy of Science: Kodiak, Alaska. IX–10–1919. Van Dyke Collection. Three paratypes same data as type, one in the collection of the author.

B². Posterior angles of pronotum prolonged, acute, the base deeply bisinuate; elytra wholly black or piceous; length 10 mm.; N. Y. and Wisc. to Ill. . . . . *sinuatus* Lec.

A². ♂ intermediate and anterior claws equal

B¹. Dorsum not uniformly black

C¹. Black; head with front and two spots on vertex pale; length 14.5 mm.; Mex., N. M., Ariz. . . *atricolor* Aubé

C². Dark brown; two spots on front, sides of pronotum, subbasal transverse line and three narrow vittae and sides of elytra pale; length 12 mm.; Me. to Fla., *calidus* F.[4]

B². Dorsum uniform black; length 12 mm.; Ind., *confusus* Blatch.

Rhantus hubbelli sp. nov.

Length 10 mm. Head black with broad front margin terminating in an obtuse angle on front and a bilobed transverse spot on vertex pale. Appendages of head pale, the apical portions of some of the segments infuscate. Pronotum pale with black spot on disc on either side of meson. Elytra pale, with disc with numerous small round black spots which fuse to form (1) short lines, (2) three series of larger irregularly shaped spots along the lines of the series of dorsal punctures, and (3) a feebly indicated subapical spot. Venter black, the lateral margins of the abdominal sternites pale. Legs pale. ♂ inner anterior claw sinuate, 9/10 length of outer which is straight; ♂ inner intermediate claw 3/5 length of outer; ♂ outer hind claw 1/2 length of inner. Type ♂: Okla., Cimmarron Co., Kenton, July 5, 1926. T. H. Hubbell. In Univ. of Mich. Mus. of Zool. Three paratype ♀'s with same data.

Key to Nearctic Species of Colymbetes Clairv.

Of the following species *seminiger* Lec. and *strigatus* Lec. are unknown to me; of the varieties *inaequalis* Horn, *rugipennis* Shp., *groenlandicus* Aubé and *thomsoni* Shp., are unknown to me.

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[4] *Meridionalis* Melsh., Ga., indicated by Leng as a variety of *calidus,* is not included.

A¹. ♂ protarsi without palettes beneath but with glandular pubescence ....subg. *Cymatopterus* Esch.
  B¹. Pronotum with sides and interrupted median fascia pale; elytra with sides pale; length 19 mm.; Europe, North America ....*paykulli* Er.
  B². Pronotum and elytra with pale side margins
    C¹. Elytra not dilated behind middle; length 16.5 mm.; Can. to N. H. and Kans. ....*longulus* Lec.
    C². Elytra dilated behind middle; length 18 mm.; Alaska, *obscuratus* Mann.
  B³. Pronotum pale with a transverse black discal spot; elytra with sides pale; epipleurae dark or (var. ♀ *inaequalis* Horn) pale; length 18 mm.; Sask., Cal., Ore., *seminiger* Lec.
A². ♂ protarsi with palettes beneath; pronotum pale with transverse black discal spot; elytra with sides pale, *Colymbetes* s. str.
  B¹. ♂ protarsi with three rows of palettes beneath and a basal band of glandular pubescence
    C¹. Transverse elytral striae more distant; legs piceous (Crotch), pale (Sharp); length 15 mm.; Cal., *strigatus* Lec.
    C². Transverse elytral striae less distant; legs pale with piceous blotches; length 15 mm.; Hudson Bay and Kans. to Wash. ....*exaratus* Lec.
  B². ♂ protarsi with four rows of palettes beneath
    C¹. ♂ protarsi moderately broadly dilated; vermiculate sculpture of pronotum forming few completely enclosed spaces; sculpture in ♂ and ♀ similar or with ♀ pronotum more deeply sculptured or (var. ♀ *rugipennis* Shp.) with ♀ pronotum and base of elytra more deeply sculptured; length 16 mm.; Labrador and Can. to N. Y. and Nebr., ? Cal. ....*sculptilis* Harr.
    C². ♂ protarsi narrowly dilated; vermiculate sculpture of pronotum forming many completely enclosed areas; ♀ pronotum more deeply sculptured; ♂ and ♀ elytral sculpture similar (var. *groenlandicus* Aubé, Greenland, Labrador) or feebly deeper in ♀ with flat intervals, the ♀ pronotal sculpture feebler than in *sculptilis* ♀, the ♂ pronotal sculpture scarcely perceptible (var. *thomsoni* Shp., Lapland, Iceland, ? Greenland), or with elytral sculpture much deeper in ♀ with convex shining intervals, the ♀ pronotal sculpture equal to that of *sculptilis* ♂ (type of species, Palaearctic, Alaska) .... *dolobratus* Payk.

Key to Nearctic Species of Dytiscus L.

The following key is based on that given by Blatchley (Col. Ind. 1910, p. 231) which in its turn was largely based on Roberts' paper (Jr. N. Y. Ent. Soc. XIII, 1905, p. 103–107). *Marginalis* L. is known to me only from Europe. I designate a pair of specimens from North Dakota as *parvulus* Mann. As regards size, shape, and color they correspond tolerably well with Sharp's description of that species, but do not possess the subinterrupted frontal suture; the ♀ is sulcate.

A¹. Labrum emarginate at middle ....subg. *Macrodytes* Thoms.
  B¹. Metacoxal process rounded
    C¹. Base and apex of pronotum not or narrowly pale
      D¹. Abdominal sternites reddish-brown with a piceous hind margin; ♀ elytra sulcate; length 25–28 mm.; Mich., Ind., N. Y., Canada ....*fasciventris* Say
      D². Abdominal sternites uniform black or piceous; ♀ elytra smooth
        E¹. Elytra without a narrow subapical yellow cross-bar; length 25–27 mm.; Mass. and Va. to Alta. and Kans. ....*hybridus* Aubé
        E². Elytra with a narrow oblique subapical yellow cross-bar; length 32–35 mm.; N. Y., Mich., Ind., *verticalis* Say
    C². Base and apex of pronotum broadly pale; ♀ dimorphic; length 30 mm.; B. C., Mich., Wash...*sublimatus* Lec.
  B². Metacoxal process pointed at apex; base and apex of pronotum broadly pale
    C¹. Metacoxal process obtuse
      D¹. Scutellum with pale disc; elytral apex and rarely the disc (Crotch) distinctly irrorate with yellow; metacoxal processes slightly wider, slightly more rapidly divergent; ♀ smooth; length 29 mm.; Alaska to Alta. and Cal. (*vexatus* Shp.)...*marginicollis* Lec.
      D². Scutellum with disc dark; with an oblique pale subapical band, the area between the band and the apex obscurely irrorate with yellow; metacoxal processes slightly narrower, slightly less rapidly divergent; ♀ dimorphic; length 33 mm.; Palaearctic, Canada, N. Y., Mich. ....*marginalis* L.
    C². Metacoxal process spinose; ♀ dimorphic; scutellum dark
      D¹. Dorsum of head not pale adjacent to eyes; abdominal sternites black, broadly pale along hind margin.

E¹. Narrower; length 26–27 mm.; Alaska, Labrador, N. D. .... *parvulus* Mann.
E². Broader; length 32–34 mm.; Baikal, Transbaikal, Manchuria; Alaska to N. H. and Calif., *dauricus* Gebl.
D². Dorsum of head with a narrow pale margin adjacent to eyes; abdominal sternites pale; form narrow; length 30–35 mm.; Palaearctic; Alaska to Cal. and Sask. .... *circumcinctus* Ahr.
A². Labrum nearly truncate .... subg. *Dytiscus* s. str.
Metacoxal process rounded; pronotum with apex and base broadly pale; sides of elytra not explanate; ♀ dimorphic; length 38–40 mm.; N. Y. and Pa. to B. C. and Wash., *harrisii* Kby.

KEY TO HOLARCTIC SPECIES OF GRAPHODERES THOMS.

The following key includes all the described species except *oberthuri* Reg. from Madagascar. The included species except *bieneri* Zimm. and *piciventris* Thoms. and the varieties *bertolini* Seidl., *rosenbergeri* Seidl. and the forms of *piciventris* are known to me from specimens.

A¹. Pronotum with black basal apical margins
B¹. ♂ mesotarsi not dilated, without palettes beneath; ♂ protarsi with four rows of palettes, claws long, unequal; meso- and metacoxae separated by a distance equal to the width of mesotibiae; elytra feebly expanded behind; epipleura narrowed at first abdominal sternite
C¹. Outer ♂ protarsal claw simple or very feebly sinuate at apex; body broader; length 13 mm.; s. Europe, *austriacus* Sturm
C². Outer ♂ protarsal claw strongly obliquely sinuate at apex; body narrower; length 13 mm.; Wash. and Alta. to Calif. .... *occidentalis* Horn[5]
B². ♂ mesotarsi dilated, with palettes beneath; ♂ protarsi with three large and numerous small palettes, claws simple; meso- and metacoxae separated by a distance less than that of the width of the mesotibiae
C¹. Epipleura narrowed at first abdominal sternite; elytra feebly wider behind
D¹. ♂ mesotarsi not broader than mesotibiae

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[5] I am indebted to Mr. J. B. Wallis for having pointed out to me the difference between *austriacus* and *occidentalis,* and all credit for the discovery should go to him.

E¹. ♂ mesotarsi with two regular rows of palettes

F¹. Venter rufous; hind legs uniform rufous

G¹. Body less broadly ovate; antennae rufous; pronotum not differentiated sexually; ♂ protarsi with about 25 palettes, the two large basal ones subequal; ♀ outer hind claw more than 1/2 as long as inner claw; black bands at base and apex of pronotum attaining both apical and basal margin, or (ab. *intermedius* Westh.) not attaining apical margin, or (ab. *simulator* Westh.) not attaining either margin; ♀ with elytra smooth or (var. ♀ *bertolini* Seidl., Tyrol) densely rugose; length 15–16 mm.; Europe; Mass. to Ill. and B. C., *cinereus* L.

G². Body more broadly ovate; antennae dark with basal portion of apical segment paler; ♂ protarsi with about 35 palettes, the inner of the two large basal ones about half the size of the outer, mesotarsi with 12 palettes in two rows; ♀ pronotum with transverse series of longitudinal striae which decrease in length mesad becoming entirely obsolete at the middle; elytral sculpture not differentiated sexually; Sikhota Alin (Siberia). (Kol. Rund. IX, 1921, p. 86) ...... *bieneri* Zimm.

F². Metasternum, metacoxae, and abdominal sternites piceous or rufopiceous; body more broadly ovate; hind legs dark with apex of femora paler; antennae rufous; length 13 mm.; Japan, *adamsi* Clark.

E². ♂ mesotarsi with three or four more or less irregular rows of palettes; ♀ outer hind claw not more than 1/2 as long as outer claw; venter rufous to flavous; body less broadly ovate; black band along apex of pronotum attaining or (ab. *interjectus* Westh.) not attaining apex; ♀ elytra smooth or (var. *rosenbergeri* Seidl., Curland) densely rugose; length 15 mm.; Hungary and Sweden to Siberia; North America (*perplexus* Shp., *elatus* Shp.) .... *zonatus* Hoppe[6]

D². ♂ mesotarsi broader than mesotibiae, with numerous irregularly arranged palettes; beneath black (type) or pale with ♀ smooth (ab. *sahlbergi* Seidl.) or densely rugose (var. ♀ *verrucifer* Sahlb.); length 15–16 mm.; Prussia, Finnland, Siberia, *piciventris* Thoms.

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[6] I am unable to include the ab. *rufotestaceous* Sahlb., Not. Sällsk. Fn. Fl. Fenn. Rörh. XIV, 1873, p. 161.

C². Epipleura narrowed at fourth abdominal sternite; elytra evidently wider behind; ♂ mesotarsi with two rows of palettes on basal three segments; length 15 mm.; Europe .... *bilineatus* DeG.

A². Pronotum unicolorous, rufous; ♂ mesotarsi with two rows of palettes on basal segment, the outer row extending onto the second segment; epipleura narrowed at first abdominal sternite; elytra feebly wider behind; length 11 mm.; Mass., N. Y., Mich., Fla., Wash. .... *liberus* Say

AUTUMN AND SPRING IN THE LIFE OF THE QUEEN POLISTES ANNULARIS AND P. PALLIPES.

By Phil Rau, Kirkwood, Mo.

In the late summer, to be exact, on September 2, 1920, about fifty nests of *Polistes annularis* were examined in their tree-top sites, and all of them were so thickly covered with adult wasps that they were absolutely black. The wasps were not coming and going, as wasps do during their busy season; these were all waiting colonies, with no work to do, since all of the larvae had pupated and the cells were empty. What causes the *P. annularis* to stop work at this time? What is their calendar? Flowers for nectar still abound. There are many empty cells that could be tenanted; caterpillars for food, and rotten wood for building material are plentiful; but with all materials convenient and inviting to industry, this idleness settles upon them. Perhaps the advent of numerous new wasps, or the presence of males, or the cold nights, caused them to sense that further work would be a waste of effort. Perhaps too the old queens had by this time gone the way of the just, and perhaps those which were on the nest were insects other than workers. It may be that this idleness was merely a condition of males and females waiting for an opportunity to do their part in the perpetuation of the species.

All these points call for further study; but let me definitely record this much, that on September 2 all of the nests were black with wasps, and several nests that were knocked down had a few marginal cells capped, with the young wasps within and many empty cells. One nest which had the outside two rows of cells capped gave forth thirty-two adults, the last of the tribe, during the following week, and strange to say there was not a male among them. They were undoubtedly the queens, but I have even up to this date been unable to distinguish the queens from the workers by external appearance. Indeed there is so little difference in appearance between them that I have held the theory that the nests of *P. annularis* and *P. pallipes* give forth originally but the two sexes, male and female, at the end of the season, and that the young females that are fertilized become queens the next season, while those that are not fertilized die off, as do the males. The young that are born the following summer, having had no opportunity to meet the males, continue to live as workers. This whole situation as I found it would at least again indicate that the males emerge before the females. The notes that follow seem to show that the host of waiting insects on the nests at the end of the season contain the potential queens waiting to be fertilized.

An examination on October 1 and 2 showed that many of the nests had been deserted; many too had been blown to the ground by the wind, but five nests, about one-fifth of the number examined, were still completely covered with adult wasps just as they had been at the visit a month earlier. This of course shows that at that time they were rapidly deserting the nests for hibernating places. It also shows that, for some unexplained reason, certain ones hung on as if for dear life until the season's last gun was fired.

Wishing to ascertain the numbers and sex of the members of these colonies, I swept the entire population of two nests into the net and individually examined them. One colony had sixty-five adults, all of them queens—not a male nor a frayed (old) worker among them! We had had two frosts that fall, probably sufficient to kill all but the queens.[1]

If the males emerge early and await the queens and fertilize them on the nest, this is not the only time when some are fertilized, nor do the males die with the first cold of autumn, as the following notes made in October will show.

It has been a problem to learn just where mating occurs in *P. annularis,* especially in the light of the above observations, wherein I found that in those nests which still retained their populations the wasps were all queens. However, the wasps which were accidently trapped in the screened porch on the hill one-half mile west gave some slight clue to their mating habits. Both sexes were there, and mating occurred frequently, in spite of the lateness of the season.[2]

For years I never saw an *anularis* nesting on the hill-top. On October 13, on the inside of the screened porch, about fifteen queens were seen, and throughout the day others were seen entering the small openings in the shanty. This of course shows that in the autumn when they seek places for hibernation they do travel considerable distances. In this case, the nearest group of nests which I had with thorough search discovered, was at least half a mile distant, in the lowlands. The same explanation probably accounts for the large numbers seen in the rocks at Cliff Cave in the very early spring of 1915 as described in "Wasp Studies Afield." At that place, the west shore of a steep, rocky cliff comes to the water's edge, while the eastern shore of the Mississippi is typical bottom land, with many willow trees. Hence I have more recently been of the opinion that the many queens found at Cliff Cave among the rocky ledges during the hibernating season, and which disappeared as completely and mysteriously at the opening of the nesting season, had come from the willows on the opposite shore to hibernate, and returned to the willows in the spring to build their nests.

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[1] Out of this population of queens, thirty-nine were preserved in fluid and examined later, when it was found that two were stylopized.

[2] Both males and females of *P. annularis* were also seen flying about the vegetation aimlessly and alone.

I know that these wasps hibernate here in the shanties on the hill-top because I found the *P. annularis* coming out on sunshiny days and rehibernating when cold evening approached. I have recorded elsewhere how on February 28 several thousand were seen flying low in the sunshine, and again gradually disappearing into their crevices as the evening chill approached. I have also mentioned elsewhere that *P. annularis* nests in moist, swampy areas. On February 28, the area was sufficiently dry for me to examine a portion of the woods that was under water almost every spring. This gave me an opportunity to examine about a dozen nests in the trees, and I was surprised to find them in a very good state of preservation, probably due to the mild winter. I mention this condition, because it has a very direct bearing on the problems that the observation has opened. On April 2 these were revisited, and several queens, from three to six, were found quietly resting on each nest. This indicated that after a winter's hibernation the insects had remembered their old home site and had returned to it. An analogous case was noticed by Sladen[3] on the bumblebee, *Bombus lapidarius*. He writes: "In the middle of June, 1907, when driving along the road near Sandwich, my attention was arrested by about twenty *lapidarius* queens endeavouring to burrow into a grassy bank facing north, the area of which was only about thirty square yards. The opinion I formed of this strange behaviour of so many queens was that they had been hibernating in the bank and were endeavouring to return to their burrows in obedience to a strong homing instinct."

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[3] The Humble-Bee, p. 137. 1912.

On April 28 these nests were again examined, and in every case the old home of the last year was deserted and a little new nest was begun just a few inches away from the old one. In few cases the new nest was a few inches above and in the others they were just a few inches below. Each nest carried from three to five queens, and it seemed evident that all had shared in the founding of the nest, because the colonies all had a large number of cells for a date so early in the season; indeed the number of cells in this lot was 48, 80, 55, 82, 60 and 25. The last and smallest nest had only one queen upon it. At this date an examination of the nests made by *P. pallipes* showed that from 2 to 14 cells were in each home; one can readily account for the enormous number of cells in the *P. annularis* nests by attributing the work to the joint efforts of several queens. The papery structure was so thin, however, that from below we could see daylight shining through; it seems that the thick card-board roof usually present is made later with the aid of the workers or with the assistance of the larvae following their habitual practice of emptying their alimentary tract just before pupating and plastering it to the roofs of the cells, where it soon hardens and gives the roof additional strength. The cells were then only shallow cups, and each contained an egg, but in the four nests that could be closely examined, not one contained any of the jelloid substance described elsewhere for *pallipes* nests.

The next discovery regarding this interesting species was that the old nests from the previous year, which at the opening of spring were in an excellent state of preservation, plainly showed that parts of them were disappearing as the new nests near by were increasing. I naturally assumed that the material was being rechewed and utilized in the new nests. To ascertain if this was really done, and how, I carefully cut down the saplings on which the nests hung, ten or fifteen feet above the ground, and thrust them back into the moist earth; this brought the nests down almost to a level with the eye, so the wasps could be the more easily observed, provided they did not object to the slight change in their elevation. A heavy rain a few hours later caused the river to rise and flood this area, so it was impossible to follow up the observations.

My visit in early April found *P. pallipes* still scarce, yet a few were seen about certain buildings, doing nothing in particular, and escaping at my appearance, though I am not admitting that my appearance warranted such conduct. Nearly a month later, however, on April 23, I saw about the various buildings about fifty wasps, each with a tiny nest. The weather at that time of year was, of course, variable; the sunshine in the afternoon became very warm, and the nights sharply chilly. During my two days' visit to the region at this time, the warm hours were very few. Meanwhile all of these new builders crouched behind their nests, very sluggish with the cold, but, judging from the size of the nests, some of them must have been very active during the few warm days just preceding. These fifty nests each had from five to fourteen cells, and almost every cell contained an egg.

In *P. annularis* at the beginning of the season I noted several queens reigning on one nest. In this spring population of *P. pallipes,* I did not find more than one queen on a single nest.[4] I happened to be nearby when one lone female, wandering about homeless, tried to alight on the new nest of a companion, but was very promptly put to rout. When queen *P. pallipes* are lost in homing flights it sometimes happens that a homeless queen comes along and adopts the nest. In June, 1922, out of eighteen such unfortunate nests, three eventually were adopted by new mothers. These new queens in turn were taken on flights and lost. One nest in a conspicuous spot in the shelter-house enjoyed the attention of three new queens in succession; one other in an equally favored place had two adopted queens, and the other had only one foster-mother. This shows that they can adapt themselves to new and advantageous conditions in preference to laboriously starting a new colony so late in the season when they have lost their own home. It also indicates that those orphan nests which are more conspicuously located have the advantage in securing new mothers.

Noting that *P. pallipes* nests only in certain buildings and certain portions of such buildings, I thought that possibly the mothers were attracted to these places because of the old nests *per se,* so I distributed several *pallipes* nests, which had been gathered elsewhere, in certain sheds where *pallipes* were building, and in other sheds where they did not occur. These were pinned to position, and made to look as natural as possible. The result was that not one new nest was found about these substitute nests. Then again, many nests were confiscated for experimental purposes before they could give forth their queens, and in each and every instance, in the following spring no nests were to be found near their places. On the other hand, wherever the colony was permitted to complete its life cycle in 1920, we found in the spring of 1921 a tiny new nest just a few inches away from the large one of the previous year. As additional evidence on this point, an accident gave further proof that certain individuals remember the spot where they were born and return to it to build their own nest, even though they hibernate at some distant place. Among the buildings on the hill-top, in the winter of 1920, I gathered abandoned nests of three colonies that I had observed the year before. Each site was marked, for my own convenience, with a large chalk mark on the wall or roof near the point of attachment. In April of the following spring, I found a nest in each of the three marked places, attached to the identical spot where the old nest had stood. Since there were thousands of square feet of sheltered space in this barn, and since the wasps utterly ignored other paper nests pinned on the walls, we can only suspect that the queens had remembered their old homesteads, aided possibly by the landmarks of chalk.

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[4] Three exceptions are described previously.

The question at once arises, how can dissemination occur if the new nests are built each spring near the old ones? But it does occur somehow, as was logically demonstrated by the following observation. In a small shed in a grain field of about three hundred acres, the only shed in a much larger area, I found a dozen nests in 1920. These were all confiscated for experimental purposes before any of the queens had come to maturity; hence this shed, which for four years had boasted from six to twelve *pallipes* nests, was now completely depopulated, and any wasps making their abode here in 1921 must be newcomers from colonies elewhere. On April 28, 1921, we found here four small nests of *pallipes,* but not one of them chanced to be near the marks which still indicated the position of the last year's nests. This shows of course that not all queens can go back to the old homestead to build their new homes, but we do see a certain number of them remembering their old home, and—the more remarkable—doing so after a lapse say of five or six months, and others disseminating, accidentally or otherwise, arriving at a good home.

MISCELLANEOUS NOTES AND DESCRIPTIONS (COLEOPTERA).

By H. C. Fall, Tyngsboro, Mass.

Microphotus Lec.

While on a recent visit to the National Museum, Mr. Barber kindly compared my own types in this genus with authentic examples of Ernest Olivier's species in the Museum collection, with the following results:

M. abbreviatus Oliv. is a synonym of *M. octarthrus* Fall.

M. fragilis Oliv. is a synonym of *M. decarthrus* Fall.

Olivier's descriptions and my own were both published in 1912, mine having priority by only a few weeks or months.

Diphytaxis excavata Horn.

A single male example of this Guatemalan species was taken by the writer at Luling, Texas, July 4, 1893. It was shortly after so identified for me by Dr. Horn, by whom the species had not long before been described in the "Biologia," and it is high time that its occurrence with us was recorded. The genus *Diphytaxis* is closely allied to *Fornax* but with male antennae flabellate, the excavation for the antennae extremely wide, and the basal joint of the hind tarsi relatively a little longer.

Goes novus n. sp.

Of same size and very nearly the same form as *pulverulentus* but slightly more robust; color throughout deep blackish fuscous, clothed with appressed cinereous hairs which on the elytra are irregularly condensed in small spots giving a feebly mottled appearance, with faint trace of darker fascia behind the middle. There is a tendency for the small spots of condensed pale hairs to become more noticeably aggregated in a transverse line behind the post-median fascia, and sometimes also at the basal fourth. On the prothorax there is an admixture of fulvous hairs, usually condensed in a small anterior spot each side of the middle.

Antennae a little less slender than in *pulverulentus* and with the apices of the joints darker; in length barely attaining or but slightly passing the elytral apex in the female and not more than one-fourth longer than the body in the male.

Prothorax one-half wider than long, a little more transverse than in *pulverulentus* and with the lateral spine less acute as a rule than in the latter. Scutellum clothed with cinereous or fulvous hairs with or without a narrow glabrous line at middle.

Elytra sparsely finely punctate, becoming sparsely granulate basally; apices almost evenly rounded; distinctly subtruncate in *pulverulentus.* Body beneath and legs cinereo-pubescent with numerous glabrous dots. Length 19–24 mm.; width 5.8–7.8 mm.

Described from a series of six examples taken by Mr. Poling at Alpine, Texas, June–July, 1926. The type is a male bearing date July 15–30.

This species by Horn's table must be associated with *pulverulentus,* from which it differs by its somewhat more robust form, darker integuments, shorter and less slender antennae with the apices of the joints darker, and the rounded elytral apices, these being subtruncate in *pulverulentus.*

A look at Casey's types in *Goes,* combined with a study of descriptions and some supplementary notes kindly furnished by Mr. Buchanan leads me to the following conclusions:

Goes marmoratus Csy. is a straight synonym of *tigrinus* DeG.

Hammoderus amplipennis Csy.

This is unquestionably the same as *Goes tesselatus* of Haldeman. Casey's reference[1] of his species to the tropical American genus *Hammoderus* was totally unwarranted and was indeed practically retracted by him a year later.[2]

Goes robinsoni Csy.

This is not a close ally of *pulverulentus* as stated by Casey, but is of the *tesselatus* type, and is in fact not to be distinguished from New Jersey and Pennsylvania examples of the latter. Whether these Middle Atlantic States specimens constitute merely a northern race of *tesselatus* proper or are to be regarded as a distinct species is not yet clear, but for the present I am inclined to take the latter view. The true *tesselatus* was described from Georgia and is known also from North Carolina. It is a distinctly larger insect and differs not only from *robinsoni* but from all other species of the genus by the presence of fine elevated lines on the elytra.

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[1] Memoirs on the Coleopt., IV. 1913, p. 295.

[2] Memoirs on the Coleopt., V. 1914, p. 368.

Goes laurenticus Csy.

The small size and obsolete posterior nebulous fascia of the elytra gives Casey's unique type an appearance somewhat unlike typical *pulverulentus,* of which however I believe it to be no more than a varietal form, or possibly a freak specimen. Until further similar examples turn up it may be attached provisionally to *pulverulentus* as a variety.

In a recent review[3] of the Species of the Tribes Orsodacnini and Criocerini (Chrysomelidae) of the Western United States, the writer—Mr. Harold R. Brisley—repeats two errors which have long prevailed among our coleopterists.

Zeugophora abnormis Lec.

Following Crotch, Horn, etc., Mr. Brisley uses this name for our species with entirely black body. I have already pointed out,[4] however, that LeConte originally gave the name to a wholly pale yellow insect, and I have in the reference cited proposed the name *atra* for the black form.

Lema nigrovittata Guér.

This name is in very general use for the Californian *Lema* which there occurs so abundantly on *Datura.* It is identical with the eastern *trilineata* in every respect except for the more or less black head, legs and under body. Typical *trilineata* extends its range to Arizona where occur intermediates of all degrees between it and the most heavily marked with black Californian specimens. Brisley correctly concludes that these variations belong to a single species but errs in using the name *nigrovittata* for the Californian form. The true *nigrovittata* of Guérin is an entirely distinct species differing from *trilineata* by its smaller size and more depressed form, and in the discal black vitta of the elytron being submedian in position (between the sixth and eighth striae) while in *trilineata* it is submarginal, attaining the tenth stria. Mr. Schaeffer has recently redescribed the true *nigrovittata* under the name *notativentris.* Inasmuch as the black marked beneath Californian form has long been segregated in collections from typical *trilineata,* it is desirable that some name be available for it, and I therefore propose that it be called **nigriventris** var. n.

Anthonomus xantus Blatch.

A cotype of this species kindly sent me by Professor Blatchley proves to be merely a pale example of *Anthonomus subfasciatus* Lec. Such specimens are not uncommon.

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[3] Pan-Pacific Entomologist, IV, pp. 114 and 118. Jan., 1928.

[4] *Ibid.,* II, p. 203. April, 1926.

Pseudanthonomus inermis Blatch.

This is *Anthonomus nubilus* Lec. Blatchley's generic reference is erroneous. The *A. nubilus* of Blatchley and Leng's Rhynchophora of Northeastern America is a very closely allied and strikingly similar insect which goes as *nubilus* or is confused with that species in most collections. It is doubtless the " variety deserving special mention " which Dietz alludes to in his remarks following the description of *nubilus* Lec. I am not entirely satisfied that this is really specifically distinct from the true *nubilus* of more southern habitat, but for the present assume it to be so and give below the only distinguishing characters that are observable. These are by no means equally evident in all individuals.

Anthonomus nubiloides n. sp.

Closely similar in nearly all respects to *nubilus,* but as a rule a little larger, of slightly stouter form, the beak a trifle longer, the elytral interspaces slightly flatter, elytral vestiture denser and more conspicuous, especially the post-scutellar spot which in all examples of *nubilus* seen is much smaller and scarcely evident except on close inspection. There is no constant difference in the antennal funicle, which shows individual variations in both species. The femora are completely unarmed in both. LeConte says of *nubilus* that " the claws are very feebly toothed at base." If there really is such a tooth I have been quite unable to detect it in any of either of the two forms now before me.

Nubiloides is widely dispersed from Maine to the District of Columbia and westward to beyond the Mississippi. The type is from Fall River, Mass., and bears date July 26, 1909.

Aside from the type, which was described from North Carolina, all specimens of *nubilus* seen by me are from Florida, where it is not rare.

Epimechus flavirostris n. sp.

Narrowly oblong-oval; piceous, legs and beak rufo- or flavotestaceous, the tip of the latter black. Body and legs clothed with a dense mat of roundish or broadly oval ashy white scales, the prothorax with three whiter vittae, the elytra with traces of similar vittae in the usual positions on alternate intervals.

Beak in the male about one-half longer than the thorax, somewhat longer in the female, in both sexes completely glabrous except at the extreme base, finely sparsely punctate and shining, not at all carinate or sulcate. Antennae rufotestaceous, club piceous, in the male inserted at apical two-fifths of beak, a little nearer the middle in the female, funicle 7-jointed, second joint about as long as the next two, these subequal and each slightly longer than wide.

Prothorax about one-fifth wider than long, sides parallel and nearly straight in basal half, gradually narrowed in front, not or scarcely constricted at apex, surface densely punctate, the punctures concealed by the scaly vestiture.

Elytra at the distinctly exposed humeri about one-third wider than the thorax, sides parallel to behind the middle, striae moderate, intervals finely punctulate.

Ventral segments 1–4 in the male decreasing in length, the 4th only slightly shorter than the 3rd, the 5th longer but not as long as the two preceding united. In the single female at hand the 4th segment is not shorter than the 3rd, the 5th relatively slightly longer than in the male. Legs moderately stout, front thighs with a small spiniform tooth, middle thighs with a still smaller tooth nearly or quite concealed by the vestiture, hind thighs unarmed; hind tibiae moderately curved apically in the male, straight in the female; claws simple. Length 2.4–2.8 mm.; width 1.2–1.35 mm.

Fairmont (Los Angeles Co.), California, April 15, 1928.

Described from a series of 4 ♂ and 1 ♀, collected and sent me by Mr. A. C. Davis, of Garden Grove, California. The type is a male.

In my table of the genus (Trans. Am. Ent. Soc., XXXIX, p. 63) this species by its dense vestiture and 7-jointed funicle will fall with *aemulus,* which is easily distinguishable by its brown and white vestiture and dark beak. Mr. Davis writes me that the specimens were taken from a yellow composite flower growing among the junipers and Joshua trees in the northern part of the county on the road to Fort Tejon.

Barilepton robusta Blatch. (Jour. N. Y. Ent. Soc., XXVIII, 1920, p. 170.)

This species is not a *Barilepton;* it should be referred to *Barinus.*

NEW SPECIES OF HALTICOTOMA AND SIXEONOTUS (HEMIPTERA, MIRIDAE).[1]

By Harry H. Knight, Ames, Iowa.

Halticotoma nicholi n. sp.

Distinguished from *valida* Reut. by the black color and the laterally projecting tubercle at base of genital segment on the left side.

♂. Length 3 mm., width 1.6 mm. Head: width .90 mm., vertex .55 mm. Rostrum: length 1.06 mm., reaching to middle of hind coxae. Antennae: segment I, length .32 mm.; II, .59 mm.; III, .41 mm.; IV, .43 mm.; black, pale pubescent. Pronotum: length .56 mm., width at base 1.27 mm.; disk finely and closely punctate.

Black, hemelytra with bluish tinge in certain lights, head above more or less brownish in some specimens. Clothed with prominent, pale, suberect pubescent hairs. Membrane fuscous, darker on basal half, veins black, smaller areole not evident. Distinguished by the prominent, blunt, laterally projecting tubercle at base of genital segment on the left side. In *valida* the tubercle is somewhat thicker and extends directly distad.

♀. Length 3 mm., width 1.7 mm. Head: width .95 mm., vertex .59 mm. Antennae: segment I, length .35 mm.; II, .59 mm.; III, .40 mm.; IV, .44 mm. Pronotum: length .58 mm., width at base 1.35 mm. Very similar to the male in pubescence and coloration.

Holotype: ♂, September 9, 1925, alt., 4500 ft., Santa Rita Mts., Arizona (A. A. Nichol); author's collection. *Allotype:* taken with the type. *Paratypes:* 18 ♂ ♀, taken with the types on *Nolina microcarpa* by Mr. Nichol. ♂ ♀, July 8, 1905, Huachuca Mts., Arizona (H. G. Barber).

Halticotoma nicholi fulvicollis n. var.

Apparently a color form of *nicholi*, but differs in having the pronotum and head except tylus, reddish brown to orange red.

Type: ♂ Sept. 9, 1925, alt. 4500 ft., Santa Rita Mts., Arizona (A. A. Nichol); author's collection.

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[1] Contribution from the Department of Zoology and Entomology, Iowa State College, Ames, Iowa.

Halticotoma cornifer n. sp.

Suggestive of *valida* Reut., but distinguished by the shorter pubescence, black legs, and in the male by the remarkable genital claspers.

♂. Length 3.46 mm., width 1.66 mm. Head: width 1.03 mm., vertex .61 mm. Rostrum, length 1.3 mm., reaching to middle of hind coxae. Antennae: segment I, length .415 mm.; II, .65 mm.; III, .45 mm.; IV, .55 mm.; black, pale pubescent. Pronotum: length .56 mm., width at base 1.33 mm.; disk distinctly and closely punctate, impressions about calli similar to those in *valida.*

Clothed with rather fine pale pubescence which is shorter than in *valida.* Color black, head and prothorax red. Tibiae not at all pale as in the dark forms of *valida.* Membrane and veins dark fuscous, somewhat paler apically. Genital segment distinctive, base of left side produced into a prominent, laterally projecting horn (length .41 mm.) which is visible from the dorsal aspect, the horn curving distally and flattened on its inner posterior face; right clasper long, curving across rear of segment, flattened apically and curving out at tip to rest above on base of the lateral horn. The true left clasper is short, about as broad as long and rests against the base of right clasper.

Holotype: ♂ July 16, 1917, Post Creek Canyon, Bonita, Arizona (H. H. Knight); author's collection.

Sixeonotus nicholi n. sp.

Uniformly black, thus suggestive of *tenebrosus* Dist. and *morio* Reut.; differs from both these species in the black tarsi and longer second antennal segment.

♂. Length 3.3 mm., width 1.5 mm. Head: width .78 mm., vertex .48 mm. Rostrum, length .75 mm., just attaining hind margin of sternum. Antennae: segment I, length .21 mm.; II, .51 mm.; III, .38 mm.; IV, .43 mm.; black, pale pubescent. Pronotum: length .86 mm., width at base 1.33 mm.; coarsely and closely punctate, moderately shining. Scutellum exposed, with basal margin only covered by pronotum, rather coarsely and deeply punctate, punctures confluent with transverse rugae, shining. Hemelytra dull opaque, clothed with fine, short pale to dusky pubescence; scutellum and pronotum with longer pale pubescence. Membrane dark fuscous with a brownish tinge, veins and areoles black.

Color uniformly black, apices of tibiae and bases of tarsi brownish black, tips of coxae somewhat pale. Clothed with moderately prominent pale pubescence, much shorter and finer on hemelytra. Genital structures distinctive; right clasper nearly cylindrical, thick, extending across genital aperture, its apical third bent at an obtuse angle, bluntly acuminate, the apex resting above dorsal lobe of the left clasper.

♀. Length 3.25 mm., width 1.54 mm. Head: width .84 mm., vertex .53 mm. Antennae: segment I, length .24 mm.; II, .49 mm.; III, .34 mm.; IV, .44 mm. Pronotum: length .84 mm., width at base 1.4 mm. Very similar to the male in pubescence and coloration.

Holotype: ♂ June 20, 1928, alt. 6200 ft., Chiricahua Mts., Arizona (A. A. Nichol); author's collection. *Allotype:* same data as the type. *Paratypes:* 6 ♂ 6 ♀, taken with the types. ♂ ♀ Aug. 10, 1907, Chiricahua Mts. (J. L. Webb).

Sixeonotus areolatus n. sp.

Distinguished by the large and prominent horn-shaped left genital clasper, also by the prominent pale pubescence and pale areoles.

♂. Length 3 mm., width 1.5 mm. Head: width .74 mm., vertex .44 mm.; strongly produced ventrally. Rostrum, length .78 mm., attaining hind margin of sternum, pale to dusky, last two segments black. Antennae: segment I, length, .28 mm.; II, .50 mm.; III, .42 mm.; IV, .47 mm.; black. Pronotum: length .90 mm., width at base 1.32 mm.; coarsely and closely punctate, basal margin sinuate but leaving scutellum exposed except for basal angles. Scutellum coarsely and closely punctate.

Black, shining, hemelytra somewhat less shining than pronotum. Legs pale and darkened with fuscous; apical half of hind femora and basal half of tibiae darker; distal tarsal segment and claws black. Vertex pale bordering the eye. Membrane pale to whitish, apical field and somewhat within areoles tinged with brownish, veins black. Clothed with prominent, suberect, whitish pubescence, somewhat shorter apically on hemelytra. Genital structures distinctive; left clasper developed into a large curved horn, a small prong near base on ventral surface; right clasper somewhat flattened and twisted, its length about half that of the left clasper; dorsal margin of genital segment produced into a plate like shield above left clasper.

♀. Length 2.7 mm., width 1.4 mm. Head: width, .74 mm., vertex .46 mm. Antennae: segment I, length .24 mm.; II,

.43 mm.; III, .38 mm.; IV, .45 mm. Pronotum: length, .84 mm., width at base 1.3 mm. Very similar to the male in pubescence and coloration.

Holotype: ♂ September 4, 1926, Summit, Mississippi (H. M. Harris); author's collection. *Allotype:* September 11, 1926, Yellville, Arkansas (H. H. Knight). *Paratypes:* 3 ♂ 4 ♀, taken with the type. 42 ♂ ♀ June 24 to June 30, 1922, Rock Island, Colorado Co., Texas (Grace O. Wiley). ♂ ♀ Aug. 22, 1905, Dallas, Texas (F. C. Bishopp). ♀ April 12, 1907, Kerrville, Texas (F. C. Pratt), on "*Tetragonotheca ludoviciana.*"

Sixeonotus dextratus n. sp.

Suggestive of *insignis* Reut. in the pale legs and antennae, but distinguished by the remarkable development of the male genitalia; left clasper very small while the right clasper is very thick and large, covered above by a large flap-like development of the segment wall.

♂. Length 2.8 mm., width 1.46 mm. Head: width .67 mm., vertex .41 mm. Rostrum, length .65 mm., not attaining hind margin of sternum, pale, last two segments black. Antennae: segment I, length .266 mm., pale, constricted base black; II, .52 mm., yellowish, brownish apically; III, .49 mm., fusco-brownish; IV, .53 mm., fuscous. Pronotum: length .84 mm., width at base 1.3 mm.; basal margin broadly sinuate, barely covering basal angles of scutellum; disk and scutellum coarsely and closely punctate.

Black, shining, hemelytra dull; membrane pale, veins black, areoles fuscous. Clothed with prominent, suberect, pale pubescence, but distinctly shorter on hemelytra. Legs pale yellowish, basal half of coxae black, claws and extreme tip of tarsi fuscous. Distinguished by the remarkable development of the genital segment and claspers; left clasper very small, slender, a small hook at tip, base with a small lobe above; right clasper very large, with two lobes spread like an outstretched thumb and index finger, the thumb portion broader and thicker than the finger, the latter projecting obliquely distad and upward to the right side, bifurcate as viewed from the side and holding between the forks, the lateral extremity of a broad plate-like expansion of the tergite wall which appears to protect the genital orifice.

♀. Length 2.6 mm., width 1.5 mm. Head: width .65 mm., vertex .415 mm. Antennae: segment I, length .24 mm.; II, .46 mm.; III, .45 mm.; IV, .53 mm. Pronotum: length, .86

mm., width at base 1.27 mm. Very similar to the male in coloration, pubescence and punctuation.

Holotype: ♂ April 25, 1926, alt. 3200 ft., Santa Catalina Mas., Arizona (A. A. Nichol); author's collection. *Allotype:* same data as type. *Paratypes:* 26 ♂ ♀, taken with the types. 21 ♂ ♀ July 23, 1917, Sabino Canyon, alt. 2500 ft., Tucson, Arizona (H. H. Knight), found breeding on pea vine (*Guardiola platyphylla*).

Sixeonotus rostratus n. sp.

Distinguished by the long rostrum which attains or slightly exceeds hind margin of sternum; length of second antennal segment greater than (♂) or equal to (♀) width of vertex; scutellum fully exposed.

♂. Length 3.3 mm., width 1.57 mm. Head: .77 mm., vertex .47 mm. Rostrum, length .83 mm., reaching to slightly beyond hind margin of sternum, or to middle of intermediate coxae, yellowish, last two segments blackish. Antennae: segment I, length .25 mm., black; II, .53 mm., fuscous to yellowish; III, .47 mm.; IV, .64 mm.; black. Pronotum: length .86 mm., width at base 1.3 mm.; basal margin strongly sinuate on middle, scutellum and pronotum coarsely and closely punctate, shining.

Black, shining, hemelytra dull or slightly shining; membrane pale to whitish, areoles and veins black. Legs pale to dusky, middle legs except coxae dusky to fuscous; hind femora black on apical half except beneath and on tips; tarsi blackish, front and hind pair paler on middle. Genital claspers suggestive of *insignis* Reut., but margin of genital segment above left clasper more strongly produced.

♀. Length 2.84 mm., width 1.5 mm. Head: width .83 mm., vertex .52 mm. Antennae: segment I, length .24 mm.; II, .52 mm.; III, broken. Pronotum: length .86 mm., width at base 1.24 mm. Very similar to the male but legs and antennae more broadly pale.

Holotype: ♂ August 9, 1925, Veta Pass, Colorado (H. H. Knight); author's collection. *Allotype:* August 2, 1900, Rico, Colorado (E. D. Ball). *Paratypes:* 9 ♂ ♀, taken with the allotype.

Sixeonotus brevirostris n. sp.

Distinguished by the short rostrum which extends but little beyond middle of sternum; length of second antennal segment just equal to (♂) or shorter than (♀) width of vertex; scutellum with basal half covered by the pronotum.

♂. Length 2.7 mm., width 1.4 mm. Head: width .69 mm., vertex .43 mm. Rostrum, length .60 mm., not reaching hind margin of sternum. Antennae: segment I, length .24 mm., black; II, .43 mm., blackish, paler apically; III, .36 mm., blackish, paler near base; IV, .49 mm., black. Pronotum: length .89 mm., width at base 1.2 mm.; basal margin sinuate, covering basal half of scutellum. Punctuation and pubescence very similar to *rostratus,* but calli smaller and less prominent.

Black, shining, but hemelytra rather dull; membrane pale to whitish, veins black, areoles blackish. Legs pale to yellowish, femora blackish apically; tibiae fuscous, paler apically; tarsi yellowish, tips blackish. Genital claspers nearly as in *rostratus,* but margin of genital segment with a distinct notch where right clasper touches the left side.

♀. Length 2.9 mm., width 1.6 mm. Head: width .78 mm., vertex .50 mm. Antennae: segment I, length .25 mm., II, .43 mm.; III, .36 mm.; IV, .50 mm. Pronotum: length .98 mm., width at base 1.4 mm. Very similar to the male in pubescence, punctuation and coloration.

Holotype: ♂ August 4, 1925, Wray, Colorado (H. H. Knight); author's collection. *Allotype:* same data as the type. *Paratypes:* 22 ♂ ♀, taken with the types. 2 ♂ 2 ♀ Sept. 12, St. George, Kansas (Kans. Agr. College).

Sixeonotus deflatus n. sp.

Allied to *insignis* Reut., but distinguished by the shorter second antennal segment, less inflated pronotal disk, longer and more prominent pubescence, and in structure of male genital segment and claspers.

♂. Length 2.7 mm., width 1.5 mm. Head: width .69 mm., vertex .415 mm. Rostrum, length .68 mm., reaching to near hind margin of sternum. Antennae: segment I, length .24 mm.; II, .45 mm.; III, .34 mm.; IV, .50 mm.; pale, last two segments fuscous. Pronotum: length .80 mm., width at base 1.3 mm.; coarsely and closely punctate, rather distinctly flattened anterior to calli; basal margin broadly sinuate on middle, covering only basal angles of scutellum; disk only moderately arched, distinctly lower than *insignis.*

Black, shining, hemelytra only slightly shining; membrane pale whitish, veins black, areoles fuscous. Legs pale yellowish, claws brownish. Dorsum clothed with suberect pale to yellowish pubescence, longer and more prominent than in *insignis*. Genital claspers distinctive, right clasper resembling form of *insignis,* but with differently rounded and slightly out-curved apex.

♀. Length 2.66 mm., width 1.4 mm. Head: width .68 mm., vertex .415 mm. Antennae: segment I, length .24 mm.; II, .47 mm.; III, .415 mm.; IV, .65 mm. Pronotum: length .81 mm., width at base 1.21 mm. Very similar to the male in form, color and pubescence.

Holotype: ♂ June 22, 1920, Ithaca, New York (H. H. Knight); author's collection. *Allotype:* July 8, 1920, Ithaca, New York (H. H. Knight). It now seems likely that some of the New York records for *insignis* Reut. will be found to refer to this species.

Sixeonotus unicolor n. sp.

Distinguished by the uniformly black color, the membrane included, and prominent, erect, white pubescence.

♂. Length 3.2 mm., width 1.48 mm. Head: width .75 mm., vertex .47 mm. Rostrum, length .65 mm., extending slightly beyond middle of sternum, black. Antennae: segment I, length .26 mm.; II, .56 mm.; III, .44 mm.; IV, broken; black. Pronotum: length .89 mm., width at base 1.3 mm.; basal margin scarcely sinuate along middle, obscuring base of scutellum, disk moderately and evenly convex, coarsely and closely punctate, shining. Scutellum coarsely punctate, apical area rather distinctly convex and with finer punctures.

Uniformly black, trochanters somewhat pale; membrane uniformly dark fuscous or black, veins black. Clothed with prominent, erect, stiff white pubescence. Genital segment and claspers distinctive; distal tergite expanded into a plate-like covering which extends distad above and beyond right clasper for a space of .18 mm. Right clasper with apical third rather slender and sharply incurved.

♀. Length 2.9 mm., width 1.48 mm. Head: width .726 mm., vertex .47 mm. Antennae: segment I, length .25 mm.; II, .53 mm.; III, broken. Pronotum: length .90 mm., width at base 1.27 mm. Very similar to the male in form, punctuation and pubescence.

Holotype: ♂ July 5, 1921, Belmont, Mississippi (C. J. Drake); author's collection. *Allotype:* same data as type. *Paratype:* ♀, taken with the types.

Sixeonotus pusillus n. sp.

Allied to *tenebrosus* Dist., but distinguished by the pale legs and less convex pronotum, ostiole black.

♂. Length 2.56 mm., width 1.2 mm. Head: width .67 mm., vertex .43 mm. Rostrum, length .52 mm., reaching to middle of sternum, pale. Antennae: segment I, length .18 mm., black; II, .47 mm., pale to fuscous, darker near base; III, broken. Pronotum: length .83 mm., width at base 1.12 mm.; disk moderately convex, punctures somewhat smaller and finer than in *tenebrosus.*

Black, legs and rostrum pale yellowish; juga, lora, and sides of tylus more or less pale. Membrane pale, veins black, areoles fuscous. Clothed with prominent, erect, pale pubescene, longer on the pronotum, shorter on the hemelytra. Genital structures distinctive; right clasper more slender, more distinctly acuminate on distal third than in *tenebrosus.*

Holotype: ♂ June 22, 1917, Dayton, Texas (H. H. Knight); author's collection. Paratypes: ♂, taken with the type. ♂, Austin, Texas (C. T. Brues).

Sixeonotus basicornis n. sp.

Distinguished by the short second antennal segment, which is not equal to width of vertex, pale, segment I black; legs and ostiole pale, membrane uniformly fuscous brown.

♀. Length 2.5 mm., width 1.4 mm. Head: width .71 mm., vertex .45 mm. Rostrum: length .68 mm., reaching hind margin of sternum, pale yellowish brown. Antennae: segment I, length .22 mm., black; II, .41 mm., yellowish; III, .33 mm., dusky yellow; IV, .59 mm., fuscous. Pronotum: length .83 mm., width at base 1.2 mm.; disk only moderately convex, coarsely and closely punctate; calli distinct, with a transverse ridge connecting anterior margins; hind margin sinuate on middle, covering base of scutellum, the latter with a few coarse punctures. Clothed with prominent pale pubescence, distinctly shorter on the hemelytra. Black, legs and ostiole pale; vertex bordering eyes, lora, and margins of juga, pale yellowish. Membrane somewhat abbreviated, uniformly fuscous brown, veins brownish black.

Holotype: ♀ June 15, 1912, Black Mountains, North Carolina (Beutenmuller); Cornell University collection.

This species comes nearest to *Sixeonotus recurvatus* Kngt., which species has the first antennal segment and apical half of membrane pale, and in the male with slender distal arm of the left clasper recurved.

An Unusual Flight Record of the Oriental Mantid Paratenodera sinensis—from New York City—Jacob Peretz, a student of the Utrecht High School, on August 30 brought to the Brooklyn Museum a living male specimen of *Paratenodera sinensis* Sauss., captured on the same day on the balcony, forty-ninth story of the Woolworth Building, New York City. The nightly brilliant illumination with reflectors and spot lights of this building undoubtedly accounts for the presence of the insect at such a height. When shown in the writer's office it proved very lively, flying out of a cardboard box, in which it had been placed, across the room, alighting on the vertical glass front of a cabinet.

I have learned since that several additional records of *P. sinensis* captured on the Woolworth Building, though at lower levels, have been brought to the attention of Wm. T. Davis and A. J. Mutchler.—George P. Engelhardt, Brooklyn Museum.

STILPNOTIA SALICIS LINN., A EUROPEAN MOTH IN THE UNITED STATES.

Among some moths taken at light near Harrison, Maine, in August, 1928, was a small white Lymantrid which looked unfamiliar to me at the time, and which has proved, upon examination, to be a male specimen of *Stilpnotia salicis* Linn., a moth common throughout Europe, but not to my knowledge hitherto reported from the United States. In view of the ease of introduction and rapid distribution of two other members of the same family, the well-known gypsy and browntail moths, it is not surprising to find still another immigrant.

Charles L. Pollard.

* * * * *

Mr. Pollard's interesting record of the capture of a specimen of *Stilpnotia salicis* at Harrison, Maine, reminded me of my personal encounter with this European moth during last July at Victoria and Vancouver, B. C. At Victoria I noticed the ragged appearance of several silver poplars in some lots not far from the Empress Hotel, and found the trees nearly defoliated excepting clusters of leaves loosely spun together and shiny black pupae with bright yellow tufts of hair within. Nearly all of the moths already had emerged and I could find only two pupae still living. These, a few days later, produced two females of *Stilpnotia salicis.* Willows in the vicinity also had been attacked, but to a lesser degree.

At Vancouver, the insect to all appearances had become a nuisance. All over the city the lustrous white moths could be seen resting on electric light poles and store windows and houses with shade trees of poplars, particularly silver poplars, had been rendered unsightly by the number of resting moths and by the caterpillars which had spun up in all sorts of places. We have not ascertained to what extent the distribution of this insect in Canada and the United States has been investigated. No doubt it has received due attention. However, its occurrence in two so widely separated regions—the Pacific Coast and in Maine—holds a menace which will stand repeating, that there may soon be added to our insect pests another European species, destructive to shade trees and annoying to man by reason of the poisonous hairs of the caterpillars to the same degree as its relatives the gypsy and browntail moths.

George P. Engelhardt,
Brooklyn Museum.

NEW SPECIES OF HETEROMEROUS COLEOPTERA.

By Edwin C. Van Dyke, University of California,
Berkeley, Calif.

Family Melandryidae.

Eustrophinus ornatus n. sp.

Elliptical, gradually narrowed behind, moderately shining, black, each elytron with two irregular dull red fasciae, the first just anterior to the middle and not reaching either suture or lateral margin, the second slightly behind the middle, not reaching the suture, but reaching the lateral margin and there extending backwards (in the paratype to the apex, where it dilates into a hook-like marking), the last segment of the antennae flavous, the four basal segments as well as the legs and median portion of the body beneath a reddish brown. Head rather finely, sparsely punctate above, eyes large, coarsely faceted and very narrowly separated above, almost approximate. Prothorax with median basal lobe well developed and truncate at apex, the disk finely and closely punctured, and the basal impressions distinct. Elytra striatopunctate, the punctures moderately coarse and close together, becoming finer towards the apex, the intervals flat and closely punctured. Propleura rather densely punctate and shining, not granular, the rest of the body beneath densely punctured, the abdomen more finely. Middle and posterior tibiae on outer side, distinctly transversely carinate and with short, closely placed setae. Length 7 mm., breadth 3.25 mm.

Holotype (No. 2581, Mus. Calif. Acad. Sci.) and one paratype in my collection, taken near Cave Creek, Chiricahua Mts., Ariz., alt. 8000 ft., June 24 and 29, 1927, by J. A. Kusche. With these I have placed a specimen in which the upper surface is black without markings, though otherwise the same as the preceding and taken at the same locality, June 29, 1927, by Mr. Kusche.

This species when fully maculated can, of course, be readily separated from our other species, but even those specimens without the red markings stand apart. From *arizonensis* (Horn), which it resembles in size and length, it can be separated by being narrower, more convex, elliptical rather than oval, with the middle basal lobe of the prothorax much more prominent as well as truncate at apex, the eyes very much closer together above (distinctly separated in the other), the propleurae not granular or roughly punctured and subopaque, but somewhat shining, and the abdomen also slightly more coarsely and less closely punctured. *Eustrophinus bicolor* (Fab.) is much smaller and proportionately shorter, with the upper surface black without markings, the legs and abdomen a bright red, and the eyes well separated above. The other related species can be readily separated by the characters given by Horn.[1] There are no

Eustrophinus arizonensis (Horn) was found by me at Idyllwild, Mt. San Jacinto, Riverside Co., Calif., July 9, 1928. *Eustrophinus bicolor* (Fab.) is represented in the collection of the California Academy of Sciences by specimens collected at the Needles, eastern San Bernardino Co., Calif., Nov. 27, 1921, by J. A. Kusche; and *Synstrophus repandus* (Horn), by specimens in my collection, collected at Victoria, Vancouver Is., June 28, 1920, as well as on other dates. The two latter species have been previously reported from the Pacific Coast by Horn, Fall and Leng, but without giving accurate localities.

Melandrya (Emmesa) testacea n. sp.

Elongate, narrow, subparallel, moderately flattened; testaceous except head and disk of pronotum, which are black and outer segments of antennae, femora and underside of body which are somewhat piceous or fuscous; and clothed with a conspicuous yet short and rather sparse golden pile. Head moderately coarsely, closely and regularly punctured, a shallow fovea at center of front; the antennae delicate, extending two segments behind base of prothorax, the second segment short, about one and a half times as long as broad, the third almost a third longer than second, and second and third together just perceptibly longer than fourth. Prothorax distinctly broader than long, slightly narrower at base of elytra, broadest at middle, the sides rather evenly arcuate, the base bisinuate with broad, shallow lobe at middle, which is slightly notched at center, hind angles sharp and slightly obtuse; the disk with median longitudinal line vague, broad and well marked lateral impressions extending from one-third distance back of apex to base and merging posteriorly with the normal basal impressions which are rather vague, the surface rather finely, not closely punctured. Elytra almost two and a half times as long as broad, broadest behind middle, apices blunt, rather evenly convex, with slight impression behind scutellum and near humeri, but without evident costae, the surface rather coarsely and closely punctured, less sharply defined apically. Beneath rather finely and closely punctured, with pile shorter and generally less conspicuous than on upper surface. Length 8 mm., breadth 2.5 mm.

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[1] Trans. Am. Entom. Soc., Vol. XV (1888), pp. 32–37.

Mexican species which could be confused with it.

Holotype (No. 2582, Mus. Calif. Acad. Sci.) and several designated paratypes from a series of eighteen specimens. The types and most of the other specimens were beaten from the dead branches of the California live oak, *Quercus agrifolia* Neé, on the hills back of Fairfax, Marion Co., Calif., May 7, 1911, or May 25, 1919. Three of the other specimens were collected near Eldridge, Sonoma Co., Calif., during April and June, 1912, by J. A. Kusche. A number of other specimens examined from Marin Co. are in the Blaisdell collection.

This species may readily be separated from any of the other American species placed in the subgenus *Emmesa* not only by the color but by the fact that the elytra are without even vague costate. *Emmesa* Newn., to which this species belongs, has recently been placed by Hatch[2] as a subgenus of *Melandrya* Fab. and to this arrangement I am inclined to agree. There is a somewhat gradual transition from *testacea* without evident costae through *connectens* Newn. and *labiata* Say to *striata* Say, the last of which has marked striae as well as costae.

Hypulus californicus n. sp.

Elongate, subcylindrical; dull reddish brown, the head black, the elytra piceous with light reddish yellow markings arranged as follows: a humeral patch extending obliquely inwards, a smaller and obscure patch near the suture and to the inner side of apex of preceding and a well marked discal patch about a third of the distance from the apex of elytra with a smaller one to the outer side, slightly behind and near the outer margin (these two latter united into a transverse fascia in the paratype); and clothed with short and sparse golden hair. Head rather coarsely, closely punctured except for a small crescentic area between front and occiput which is smooth; the eyes prominent and coarsely

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[2] Concerning Melandryidae (Coleoptera), by Melville H. Hatch, Anns. Entom. Soc. Am., Vol. XX (1927), pp. 363–366.

> granular; and the antennae extending at least two segments beyond the hind margin of prothorax, slightly enlarged outwardly, the second segment one-half longer than broad, the third over twice as long as broad and slightly longer than fourth. Prothorax somewhat broader than long, broadest in front of middle, the sides straight and parallel behind, thence evenly though slightly arcuate to apex, disk rather coarsely and closely punctured, more closely at sides, a shallow fovea in median line near base, the basal impressions triangular and deeply impressed. Elytra about twice as long as wide, gradually wider from humeri to posterior third, thence rather suddenly narrowed to apex, the surface punctured like pronotum though not so closely at sides and more finely posteriorly. Beneath coarsely and closely punctured in front, abdomen finely and sparsely punctured on anterior segments and finely and obscurely punctured on posterior segments. Length 4.25 mm., breadth 1.5 mm.

Holotype (No. 2583, Mus. Calif. Acad. Sci.) and one paratype collected by myself from beneath the bark of an old yellow pine stump near Carrville, Trinity Co., Calif., June 28, 1913.

The only other species of this genus in America is *Hypulus simulator* Newn., found in eastern Canada, New York and Ohio, a species which differs markedly from *californicus*. *Hypulus simulator* Newn. is much flatter, not subcylindrical, the prothorax with the lateral impressions not limited to the base, but extending well forwards and also broader, and the elytra with a different color pattern, being black with two irregular and quite complete light fasciae, the anterior just ante-median and the posterior subapical. *Hypulus californicus* is in shape and general appearance quite close to the European *Hypulus bifasciatus* Fab. and is, therefore, probably a more typical species than is *simulans.*

Phloetrya riversii Lec.

This species is quite variable as regards the lateral prothoracic margin. In my Yosemite Valley specimens, the margin disappears slightly beyond the middle, in some of the coastal specimens it continues on almost to the anterior margin, while in one from Humboldt Co., it is distinct even to the anterior margin. The species can, however, always be separated from *vaudoueri* Muls., which is also found in California, by having the pronotum shining and with the punctures more or less distinctly separated whereas in the latter the pronotum is distinctly opaque and the punctures approximate.

Osphya essigi n. sp.

> Moderately elongate, subparallel, flattened, clothed with fine, rather sparse pile; and piceous except front of head, basal segments of antennae, prothorax, greater part of forelegs, bases of femora and tibiae of middle and hind legs, and narrow margin of elytra which are luteous; in addition there is a poorly defined broad discal yellowish stripe on each elytron. Head flattened in front, moderately coarsely, closely punctured; eyes large and prominent; antennae long and delicate, reaching beyond middle of elytra, second segment one-half longer than broad, third about twice as long as second and distinctly longer than fourth. Prothorax subquadrate, wider than long, anterior, posterior and side margins all feebly arcuate, disk narrowly flattened near side margins and rather finely, somewhat closely punctured, the basal impressions distinct. Elytra about two and one-half times as long as broad and finely, closely punctured. Beneath rather coarsely, closely punctured in front, very finely and closely punctured on abdomen. Length 7 mm., breadth 2.5 mm.
>
> Male. Hind femora enlarged and arcuate, hind tibiae slightly bowed and without lateral spinous process, first abdominal segment with an acute and backward projecting tubercle and second abdominal segment with a much elongated spinous process, faintly bifid at extremity, arising from its center and just posterior to the anterior tubercle.

Holotype (No. 2584, Mus. Calif. Acad. Sci.), a unique male collected at Morgan Hill, Santa Clara Co., Calif., May 17, 1922, by Prof. E. O. Essig and by him kindly presented to me.

This species differs from *varians* (Lec.) by being proportionately broader, shorted and flatter, by the lighter coloration being yellowish rather than red and the elytra with light lateral margins and discal vittae, not sutural; the third antennal segment evidently longer than the fourth, not shorter as in *varians;* and the peculiar sexual characters of the male, the tubercular process on the middle of the first abdominal and the spinous process on the second abdominal segment, and the lack of the lateral process to the hind tibiae, the former being absent and the latter spinous present in *varians*. *Osphya essigi* is on the other hand apparently quite closely related to the Guatemalan *Osphya tuberculiventris*

Champ.,[3] being somewhat similarly colored, lacking the spinous process to the hind tibiae in the males and possessing ventral processes. The processes are, however, of different type in the two, *tuberculiventris* having short tubercles on the first, second and third ventral segments. From *luteus* (Horn), *essigi* differs by being much smaller, more distinctly bicolored, proportionally shorter and broader, especially the prothorax, the punctuation of the upper surface much finer, and the secondary genital characters decidedly different.

SYNOPTIC KEY TO OSPHYA.

1. Species distinctly bicolored, the head, elytra and abdomen in great part piceous 2
   Species almost unicolored, the legs and under surface merely of a lighter shade of yellowish or reddish testaceous; prothorax elongate, almost as long as broad; males without the long lateral-tibial or abdominal processes; length 8–10.5 mm. S. Calif. . . . . *luteus* (Horn)
2. Third antennal segment distinctly longer than fourth, entire length less than three times breadth, prothorax about one-fourth broader than long; males without tibial spurs but with spinous processes on first and second abdominal segments; length 7 mm. C. Calif. . . . . **essigi** n. sp.
   Third antennal segment evidently shorter than fourth, entire length about three times breadth, prothorax but slightly broader than long; males with long lateral spinous processes to tibiae but without abdominal processes; length 5–7.5 mm. Tex., Kan., Ind. . . . . *varians* (Lec.)

Lacconotus pallidus n. sp.

Elongate, rufotestaceous, elytra and legs lighter, sparsely clothed with short pale hair and moderately shining. Head densely rather coarsely punctured; antennae delicate, reaching slightly beyond base of prothorax, segments all slightly beyond base of prothorax, segments all slightly longer than broad; eyes prominent. Prothorax quadrate, subcylindrical, about as long as broad, apex just perceptibly narrower than base, with sides feebly arcuate, the disk densely, distinctly punctured, and with shallow lateral foveae. Elytra distinctly broader than prothorax, two and two-sevenths times as long as head and prothorax together, broader behind the

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[3] Biol. Centrali-Amer., Vol. IV, Pt. 2 (1889), Heteromera, by Geo. C. Champion, p. 95, Pl. 4, Figs. 25 and 25*a*.

> middle, densely and distinctly punctured, not more finely than the pronotum. Length 5 mm., breadth 2 mm .
>
> Male. Second ventral segment with a small oval elevated space covered with a tuft of yellowish pubescence.

Holotype male, allotype female (Nos. 2585, 2586, Mus. Calif. Acad. Sci.), and four paratypes, the first from Mt. Wilson, Los Angeles Co., Calif., June 13, the allotype and one paratype from Carmel, Monterey Co., Calif., June 4, 1916, all from my collection; the others from Paraiso Springs, Monterey Co., Calif., May 28–31, 1916–1924, in the L. S. Slevin collection of the California Academy of Sciences. In the Blaisdell collection, there is also a specimen from Poway, San Diego Co., Calif.

This species has for some time been confused with *Lacconotus pinicola* Horn, but it differs from that in color, in having a narrower and more cylindrical prothorax, the prothorax of *pinicola* being evidently broader than long and broader at base, the elytra shorter proportionately and with the punctures more distinctly impressed, the elytra in *pinicola* being two and four-sevenths times as long as head and prothorax together and the punctures very fine and shallowly impressed. The new species seems to be more southern in distribution than the other, my specimens of *pinicola* being from Manitou and Paonia, Colorado, and from Carrville, Trinity Co., Calif. Dr. Horn records it from western Nevada. The specimen listed by Fall[4] from southern California was evidently *pallidus* not the true *pinicola* as cited. The following table, a modification of that given by Horn,[5] will differentiate our three American species.

SYNOPTIC KEY TO LACCONOTUS.

1. Bicolored species, black, thorax reddish yellow with median black space .... *punctatus* Lec.
   Unicolored species 2
2. Piceous, prothorax evidently broader than long, elytra over two and a half times as long as head and prothorax and with punctuation much finer and less deep than that of pronotum, *pinicola* Horn

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[4] Coleoptera from Southern California by H. C. Fall. Occas. Pap. Calif. Acad. Sci., Vol. VIII (1901), p. 177.

[5] Notes on the Mycteridae and other Heteromera, by George H. Horn, Trans. Amer. Entom. Soc., Vol. VII (1879), p. 338.

Rufotestaceous, prothorax about as broad as long, elytra less than two and a half times as long as head and prothorax and with punctuation almost as course and as deeply impressed as that of pronotum .... **pallidus** n. sp.

FAMILY PYTHIDAE.

Cononotus substriatus n. sp.

Elongate, rufotestaceous, legs lighter, sparsely and very finely pilose. Head including eyes about as broad as prothorax, moderately but not closely nor distinctly punctured, eyes prominent, antennae reaching beyond base of prothorax. Prothorax obconical, convex, one-half broader in front than behind and about a half as broad as long, sides faintly sinuate behind, moderately arcuate in front, disk moderately coarsely but not closely punctured. Elytra elongate oval, convex, striae faintly though evidently impressed anteriorly, evanescent apically, and coarsely, somewhat closely punctured. Length 3 mm., breadth .75 mm.

Holotype (No. 2587, Mus. Calif. Acad. Sci.) and three paratypes collected by myself at Los Angeles, Calif.

This species occupies the same territory as *Cononotus sericans* Lec. but differs greatly from that in being in general slightly smaller, with prothorax less broad in front and much less closely punctured, and the elytra with large punctures arranged in definite striae, not confused and finely punctured as in the other. From *macer* Horn and *punctatus* Lec., it differs by having the striae quite evidently impressed; from the first, in addition, by being rather sparsely pilose, with the prothorax broader anteriorly and the elytra also broader anteriorly and with sides somewhat oblique near base; and also from the second, by being considerably larger, much darker, and the elytra somewhat broader towards base.

SYNOPTIC KEY TO CONONOTUS.

1. Elytra with punctures numerous and irregularly dispersed, length 2.75–3.25 mm. S. Calif. .... *sericans* Lec.
   Elytra with punctures coarser and arranged in rows 2
2. Surface densely clothed with pubescence, elytra quite elliptical, the striae not impressed, length 3 mm. Owens Valley, Calif. .... *macer* Horn.
   Surface sparsely pubescent 3

3. Larger and darker species, elytral striae evidently impressed, the elytra slightly broader anteriorly, length 2.5–3 mm. Los Angeles, Calif. .... **substriatus** n. sp.
Smaller and more testaceous species, elytral striae not distinctly impressed, the elytra elliptical, length 1.75–2 mm. Santa Clara and Alameda Co., Calif. ...... *punctatus* Lec.

FAMILY PYROCHROIDAE.

Dendroides marginata n. sp.

Elongate, subparallel, flattened, shining, rufotestaceous, the eyes, antennae from the third segment outwards and the elytra except the lateral margin black. Head obscurely and finely punctured in front, the neck more evidently punctured; the eyes prominent, in the male narrowly separated above, in the female widely separated, the interocular area about as wide as breadth of eyes; antennae long and delicate in male, reaching well beyond middle of elytra, the appendages of intermediate segments averaging four times the length of the segments, the terminal segment about equalling the three preceding united, the antennae in female hardly reaching the middle of elytra and the appendages of intermediate segments averaging about three-fourths the length of the segments, the terminal segment almost equalling the length of the two preceding united. Prothorax slightly broader than long, the surface smooth and shining, the punctures minute and sparsely placed. Elytra about three times as long as broad, the punctures irregular, moderately coarse and distinctly separated, the intervals between punctures irregularly elevated giving surface a somewhat rugose appearance, the pubescence short and sparse. Beneath rather finely and shallowly punctured. Male, length 14 mm., breadth 4 mm.; female, length 16 mm., breadth 5 mm.

Holotype male, allotype female (Nos. 2588, 2589, Mus. Calif. Acad. Sci.), and several designated paratypes from a series of fourteen specimens; the holotype collected by J. C. Huguenin at Muir Woods, Marin Co., Calif., May 5, 1913; the allotype collected by myself at the same locality, May 24, 1908; the remainder mostly collected by myself and from Muir Woods during May, from Lagunitas, Marin Co., Calif., April 13, 1905; Guerneville, Sonoma Co., May 29, 1908; Carrville, Trinity Co., June 26, 1913, and Mad River, Humboldt Co., July, 1901. Other specimens were collected at Sobre Vista, Sonoma Co., May 21, 1911, by J. A. Kusche, and eleven specimens are in the Blaisdell Collection of the California Academy of Sciences.

This species because of its coloration and shiny appearance superficially closely resembles *Dendroides bicolor* Newn. but it differs from that by having the two basal segments of the antennae rufous, not piceous, the lateral margin of the elytra distinctly testaceous; the eyes in the males narrowly separated above, not approximate, and in the females widely separated; the prothorax slightly broader than long and with punctures so minute that they are hardly observable whereas the prothorax is about as broad as long and with rather coarse though sparse punctures in *bicolor;* and the elytra much less densely and closely punctured and somewhat rugose. From *Dendroides picipes* Horn which occurs in its territory, it differs by having the legs and entire ventral surface as well as the two basal segments of the antennae rufotestaceous, not piceous. In *picipes* the eyes are much closer together, almost approximate above in the male and closer than the width of the eyes in the female, the prothorax slightly more robust, and the elytra with the punctures more numerous and closer together as well as with a more evident pilosity. The definite physical differences would, of course, prevent *marginata* and *picipes* from being considered as mere color phases of a dichromatic species.

Pedilus parvicollis Fall, I would place as an undoubted *Dendroides.* I have critically examined it time and time again and can come to no other conclusion. The shape of the head, prothorax and elytral features as well as the generic and family characters are those of the latter and not of *Pedilus.*

FAMILY CEPHALOIDAE.

Cephaloon (Typitium) pacificum n. sp.

Slender, testaceous, greater part of head, outer segments of antennae, sides and median vitta of prothorax, scutellum, narrow sutural and lateral stripe of elytra, median portion of body beneath, and tibiae and tarsi black or piceous, and sparsely clothed with fine pubescence. Head elongate, lozenge shaped, finely and shallowly punctured, eyes prominent, antennae slender, reaching fully to middle of elytra, three outer segments dilated and elongate. Prothorax elongate, campanulate, hind angles acute, finely, closely, punctured. Elytra three times as long as broad, finely, closely yet shallowly punctured. Beneath finely, closely punctured. Legs long and slender, the appendages or pulvilli of the tarsal claws very slender and acutely pointed at apex. Length 11 mm., breadth 2.5 mm.

> Male. Eyes rather narrowly separated in front, interocular area less than diameter of eyes, ninth and tenth antennal segments at least four times length, the eleventh much longer.
>
> Female. Eyes rather widely separated in front, the interocular space equalling breadth of eyes, the ninth and tenth antennal segments not more than three times length. In addition the females are more robust and generally larger, more uniformly testaceous in color though with portions of the head, sides of prothorax, margins of scutellum, a narrow stripe near lateral margin of elytra, and mid-section of body beneath somewhat piceous.

Holotype male, allotype female (Nos. 2590, 2591, Mus. Calif. Acad. Sci.), and three paratypes in my collection, the first two collected at Forks, Wash., July 2, 1920, and July 5, 1920, a female paratype collected at the Forks, July 2, 1920, and the two male paratypes, one from Lake Quiniault, Wash., May 31, 1914, the other from Humboldt Co., Calif., July, 1901.

This species is slightly variable as to color as are most of our species. It is also very closely related to *ungulare* Lec., but differs from that chiefly in having much longer antennae, over 12 mm. in the male as against a bare 11 mm. for the male of *ungulare*; in having more prominent eyes and closer together, in males less than breadth of eyes apart while in *ungulare* they are fully the breadth of the eyes apart; and a prothorax that is always distinctly dilated in front of the middle.

The genus *Cephaloon,* I do not believe, should be split up into weak genera as was done by Col. Casey.[6] With the possible exception of *Drachylis,* all of the others should be placed as subgenera and nothing more. The males of the species described above are so much like some of the male specimens of *tenuicorne* Lec. that they cannot be separated with certainty except by examining the pulvilli. Of the species described from western America, *bicolor* Horn is as definitely dichromatic as is *lepturoides* Newn., there being an almost all yellow phase as well as the red and black phase; *piceum* Horn may have the base of the elytra testaceous or much of the legs as well as prothorax and elytra testaceous; and the males of *tenuicorne* Lec. may be to quite an extent piceous or black.

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[6] Studies in Cephaloidea by Thos. L. Casey, Entom. News, Vol. IX (1898), pp. 193–195.

FAMILY MELOIDAE.

Epicauta impressifrons n. sp.

> Small and rather short, black, rather densely clothed with cinereous pile. Head quadrate, rather finely, sparsely punctured and where denuded shining, the median longitudinal impression distinctly impressed throughout, the vertex as a result slightly notched; the eyes prominent, evidently projecting beyond side margins of head and but slightly emarginate in front; the antennae rather short, extending backwards to but one-third the length of the elytra, segments closely articulated and but slightly narrowed apically. Prothorax somewhat quadrate, just perceptibly broader than long, sides almost straight and parallel, where denuded shining and finely, rather sparsely punctured, the punctures separated by from one to three times their own diameter, the median longitudinal line distinctly impressed at middle. Elytra almost three times as long as broad, finely, rather closely, shallowly punctured and finely rugose, the sutural margin somewhat elevated basally. Beneath finely punctured and very closely so on abdomen. Length 8 mm., breadth 2.5 mm.

Holotype (No. 2592, Mus. Calif. Acad. Sci.) and three paratypes in my collection, collected at Palm Springs, Riverside Co., Calif., March 6, 1924, by Mr. J. D. Gunder and given to me by Mr. Alonzo C. Davis. Mr. Davis also has several paratypes in his collection.

This species is without doubt closely related to the Arizona *Epicauta caviceps* Horn but differs from that in the main by being smaller, with the median longitudinal portion of head lineally impressed, not sulcate, and by lacking the post ocular tubercles which are so conspicuous in *caviceps,* by having the pronotum less deeply impressed at middle and without the disk greatly elevated on either side, and the basal margin not so distinctly elevated.

NESTING HABITS OF THE BEE, NOMIS NORTONII CRESSON, IN TEXAS.

By H. B. Parks, San Antonio, Tex.

Throughout April, 1928, the office of the Texas Apicultural Research Laboratory was busy answering inquiries about a black bee that was at work in the cotton and corn fields. These inquiries came from a territory some twenty miles wide and seventy miles long. The nearest infestation was visited and the following conditions were found. The "towns" as the farmers called them were located on points of hills or tops of ridges and ranged in size from a few nests to one town that was estimated by the owner of the land to cover over two and a half acres.

This large town was located on the point of a hill in a cotton field. The bees were so numerous that the hired help and mules refused to work over it. The entire surface of the location was covered with the soil brought out of the burrows and the air was filled with circling bees. Several burrows were dug out and gave the following. The tunnel went straight down through three inches of black loose soil where it encountered a wet red clay. Just at the surface of the clay a side tunnel one and a half inches long led to a room about one half inch in diameter. In this room was a newly emerged female. Three inches below the first side tunnel was another. The room at its end contained a pupa just ready to emerge. The main tunnel continued downward eighteen inches. The lower rooms contained balls of pollen and nectar with an egg on top. The inside of both tunnels and rooms showed that the surfaces had been plastered with some foreign soil. Observation showed that more than one female inhabited a burrow. The mass of wheeling, humming insects which so terrorized the hired help and the mules, were thought to be males, as females were common on the ground at the mouths of burrows. Many of the flying bees were caught and all proved to be females. The first report of this trouble came April 6, and a report July 1 said that all the bees had disappeared. On August 15 a hole was dug on the site of one of these towns and from a depth of eight inches to eighteen inches a live pupa was found in every room. Through the kindness of Mr. Geo. P. Engelhardt specimens were submitted to Mr. Herbert F. Schwarz, of the American Museum of Natural History, who determined this insect to be *Nomis nortonii* Cresson. He notes that Dr. Lutz has also noted this bee in vast numbers in Colorado.

TWO NEW LYGAEIDAE FROM THE WESTERN UNITED STATES. (HEMIPTERA-LYGAEIDAE).

H. G. Barber, Roselle, N. J.

Thylochromus n. gen.

Shining; sparsely pilose. Head a little wider than long, sparsely and finely punctate; eyes not quite in contact with the anterior angles of pronotum; ocelli minute, set rather close to eyes; anteocular lateral margins about as long as the eyes; apex of head reaching to middle point of basal segment of antenna, the latter much shorter than basal segment of rostrum; second segment of antenna longest, third and fourth subequal; rostrum rather long, its apex reaching behind the posterior coxae, second segment longer than basal one, third a little shorter than second. Pronotum a little wider than long with the margins simply carinate not expanded, anterior lobe just over twice as long as the posterior one, the constriction between shallow, obtuse both laterally and dorsally; posterior lobe finely punctate; anterior angles behind eyes obtusely rounded, the diameter of this anterior part decidedly wider than head across eyes; anterior margin nearly straight, without a constricted collar; humeral angles obtusely rounded; posterior margin rather strongly concavely arcuate. Scutellum equilateral, slightly carinate toward apex. Hemelytra with the commissure less than half the length of scutellum; clavus with three rows of punctures; corium coarsely punctate, with inconspicuous median vein; membrane not reaching apex of abdomen. Anterior femora strongly incrassate, armed with a single large tooth, preceded and followed by a single series of fine spinules; intermediate and hind femora somewhat clavate; anterior tibia strongly curved; all tibiae finely pilose not long setose; posterior tarsi with basal segment much longer than the two apical ones taken together. Venter finely pilose, polished, the lateral incisure between the second and third segments anteriorly curved; the two lateral opaque, glandular spots of the fourth segment placed far apart, the posterior one near the posterior margin of the segment.

This genus belongs to the Tribe Rhyparochromini, most closely related to the genus *Rhyparochromus.* It may be distinguished from that genus by its smaller size, longer head not imbedded to the eyes, longer rostrum and antennae and different armature of the anterior femora. It bears also some resemblance to the genus *Macrodema.*

Thylochromus nitidulus n. sp.

Macropterous female: Shining dark brown, sparsely pilose; rostrum except sometimes the basal segment, coxae, trochanters, acetabula, anterior and intermediate tibiae and the tarsi ferrugino-testaceous; hemielytra with base widely and a post median costal fascia sordid testaceous.

Head very finely sparsely punctate, a trifle wider across eyes than long, postocular margins very short; eyes not quite in contact with anterior angles of pronotum, anteocular margin to apex of antenniferous tubercles a little longer than eyes; apex of tylus reaching about to the middle of basal segment of antenna. Ocelli minute, set rather close to eyes. Antennae castaneous, finely pilose, with second segment twice as long as basal, third and fourth segments subequal, each about one third shorter than second; first and second slightly pale at base. Rostrum long, its apex reaching beyond basal margin of third abdominal segment; basal segment a little longer than head, second one third longer than first, third segment a little shorter than second, fourth about one-half the length of basal. Pronotum sparsely pilose, one fourth wider than long, obtusely constricted well behind middle, anterior lobe over twice as long as posterior one; lateral margins lightly carinate, not at all expanded; anterior angles rounded, lateral margins behind this lightly rounded, nearly parallel; disk smooth, faintly punctate along the anterior margin; posterior lobe somewhat wider but much shorter than anterior lobe, sparsely, finely punctate; posterior margin slightly concavely arcuate. Scutellum equilateral, subshining, sparsely pale pilose, central disk and sides sparsely punctate, somewhat carinate at apex. Hemelytra with embrowned clavus declivous, with three rows of punctures; commissure less than one half the length of scutellum. Corium finely pilose, with two rows of punctures paralleling the claval suture and coarsely but sparsely punctate posteriorly; lateral margins gently arcuate throughout. Membrane fumose-hyaline, infuscated at inner basal margin; apex not reaching to end of abdomen. Fore femora strongly incrassate, armed below half way between middle point and apex with a stronger tooth, with several smaller acute spinules before and behind this. Anterior tibiae strongly curved, unarmed. Posterior tibiae finely pilose. Posterior tarsi with basal segment longer than the two apical ones taken together. Prosternum and venter shining, the latter almost impunctate, sparsely long pilose.

Brachypterous form: Pronotum as wide as long, with anterior lobe six or seven times as long as the short more depressed posterior lobe; lateral margins of the anterior lobe gradually converging posteriorly from before the middle point to the sinus between the lobes, wider at middle point than the diameter of posterior lobe, the latter closely punctate. Scutellum finely punctate. Hemelytra with clavus level with corium and provided with three regular rows of punctures; apical margin of corium obliquely truncate; outer rounded apical angle about reaching middle point of third abdominal segment; membrane entirely absent; surface closely, coarsely punctate; commissure about equal to length of scutellum; the two sordid white spots almost obliterated. Length 3.5–4 mm.

Type: macropterous female, Pasadena, Calif., March 7, 1928. *Allotype:* brachypterous male, Pasadena, Calif., April 7, 1928. *Paratypes:* 4 males, 11 females, Pasadena, Calif. (Arroyo Seco Canyon), March and April, 1928; 5 males and 4 females, Griffith's Park, Los Angeles, Calif., March and April, 1928; 1 female Harbison Canyon, San Diego Co., Calif., March 22, 1928.

All specimens were taken by the author in sifting dead leaves. All are brachypterous except the type. Paratypes have been deposited in the California Academy of Sciences, U. S. National Museum and the American Museum of Natural History.

Ozophora depicturata n. sp.

Color: Head, anterior lobe of pronotum, scutellum, faint post-median costal fascia and apical angle of corium, and pleura dull castaneous brown; posterior lobe of pronotum and submarginal striae of scutellum ferrugino-testaceous: apex of scutellum, hemelytra in great part, antennae, legs and rostrum pale stramineous yellow; antennae with apex of third segment and apical half of fourth segment embrowned, basal half of terminal segment white; membrane infuscated with apex triangularly whitish; venter ferrugineous.

Dorsal parts glabrous. Head one seventh longer than wide, with apex reaching nearly to middle point of basal segment of antennae; ocelli a little over twice as far apart as each from the eyes; antennae one fifth shorter than body, second segment over twice as long as basal one, third and fourth subequal, each about one fourth shorter than second segment. Rostrum with apex reaching nearly to middle of second abdominal segment, first and second segments subequal, third segment one fourth shorter than second, fourth segment one half the length of third. Pronotum a little shorter than head, one-third wider than long, rather lightly obtusely constricted before the middle, with anterior lobe about twice the length of posterior lobe; lateral margins merely carinate, neither expanded nor reflexed; disk of anterior lobe smooth, a line of fine punctures along depressed anterior margin as well as along the lateral margins and down the center of disk; posterior lobe well over twice as wide as long rather closely punctate with ferrugineous. Scutellum one fifth longer than wide, with a double series of fine punctures along the margins, more sparsely punctate on the flattened disk; a submarginal calloused streak along each margin coalescing before the apex which is smooth and pale. Hemelytra about three times as long as wide, over twice as long as the head and pronotum taken together; clavus with an inner and outer regular row of fine punctures, irregularly punctate within; commissure a little shorter than scutellum; corium sparsely punctate with ferrugineous, postmedian lateral fascia opposite apex of commissure nearly erased; costal margins rather widely expanded and recurved; apex embrowned. Membrane dark smoky brown with outer basal angle slightly and apex broadly, triangularly sordid white. Venter dull ferrugineous, nearly smooth. Legs pale stramineous with posterior femora faintly banded near apex; fore femora lightly incrassate, armed beneath with four equidistant small setigerous spines. Length, 7.5 mm.; width, 1.9 mm.

Type: male Griffith's Park, Los Angeles, Calif., March 6, 1928. *Allotype:* Huachuca Mts., Arizona, July 26, 1905. *Paratypes:* 3 males and 5 females, same data as type; 7 males and 9 females, same data as the allotype; 3 males and 3 females, Sabino Basin, Sta. Catalina Mts., Ariz., July 8–20, 1916 (Amer. Mus. Nat. Hist.); 3 females Santa Rita Mts., Ariz. (collected by A. A. Nichol for Agr. Coll. Iowa).

All of the Los Angeles and Huachuca Mts. specimens were collected by the author, the former by sifting the nests of the wood rat. This species I had previously identified as *consanguinea* Distant. It is rather closely related to *picturata* Uhler, but relatively longer and with the corium differently marked; the lateral margins of the pronotum much less evidently expanded; the head longer in relation to its width across the eyes. The Arizona specimens are all paler than the California ones.

BUTTERFLY ABERRATIONS

By C. Rummel, *Newark, N. J.*

Heodes thoe Dalm., aberration. One male specimen taken at North Arlington, N. J., June 6, 1920—in collection of C. Rummel.

The brown ground color of normal *thoe* is replaced by grayish brown with the same bluish metallic cast as in normal *thoe.* The orange brown zigzag band near the outer margin of the secondaries is replaced with pale yellow. On the under side all the brown is replaced with pale yellow. All black spots remain the same as on normal *thoe.*

Heodes hypophlaeas Bdv., ab. **fulvus.** Two male specimens, one taken at Green Village, N. J., July 14, 1924, and one at Old Bridge, N. J., July 6, 1891—in collection of C. Rummel.

Two-thirds of the primaries extending from apex along costal margin to discal area and covering limbal area to inner margin is brownish black, eliminating all but the innermost of the dark black spots. Secondaries and under side remain the same as normal *hypophlaeas.*

Heodes hypophlaeas Bdv., ab. **neui.** One female specimen taken at Hillside, N. J., June 2, 1924—in collection of C. Rummel.

This aberration differs from normal *hypophlaeas* in that the entire limbal area and extending along border and inner margin to base of primaries is covered with one dull yellowish white patch, excepting the little black dots, leaving all but two of the black dots on a white field. The two innermost black dots remain surrounded by brown. Secondaries remain normal. Under side corresponds with the upper side.

AN OBSERVATION ON THE BREEDING HABITS OF CHLORION HARRISI IN TEXAS (HYMENOPTERA).

By George P. Engelhardt, Brooklyn Museum, Brooklyn, N. Y.

On a ramble over the grounds of the Texas Agricultural Research Laboratory near San Antonio, where I spent a week with my friend, H. B. Parks, in charge of the Station, early in April 1928, my attention was drawn to a growth of dead and wilted yuccas of a branching variety about which hundreds of dark colored wasps were circling and swarming. As far as the needle pointed stiff leaves permitted, I endeavored to examine the interior dense portions of the plant without finding anything indicative of so unusual a gathering. Then, standing off at a distance, I observed several of the wasps, carrying a loose dangling substance and entering the long, narrow tubes formed by the folding of the leaves during the drying up process. These tubes throughout their length of fifteen to eighteen inches were filled with dry soft grasses, leaving however spaces or chambers in orderly arrangement, each containing three or four nymphs in the second instar of one of the large, spiny Texan katydids. In the lower chambers a young wasp larva already was feasting on the stored food, while in the upper chambers was found a small oblong white egg attached to one of the nymphs. A sweep of the net through the swarming wasps resulted in the capture of a dozen or more examples. These, submitted to Dr. H. T. Fernald, Chief of the Department of Entomology, Massachusetts Agricultural College, have been determined as *Chlorion harrisi* Fernald, all males, as the writer neglected at the time to go after the more secretive and business bent females.

The stored nymphs of the spiny katydid, at once suggested a species of which several adults were collected on a previous visit to San Antonio in late May 1927. It is *Rehnia spinosa* Caudell, identified by A. N. Caudell from the type and one additional specimen in the U. S. National Museum collection. This fine katydid, sparsely if at all represented in most museum collections, measures three to four inches in length, has abbreviated flightless wings and powerful jumping legs heavily armed with spines. It is found in colors varying from green to brown. When taken in hand its mandibles are sufficiently strong to draw blood.

Locally not uncommon, its preferred haunts among cacti, yuccas and other spiny plants render capture difficult. Its large, usually food-laden abdomen in collected specimens is subject to rapid, offensive decay and discoloration. First class cabinet specimens require immediate cleaning and substitution of the abdominal contents.

Of the forty or fifty brood cells of *Chlorion* examined in the yucca leaf tubes, everyone proved to be stored exclusively with the nymphs of *Rehnia spinosa.* Thus the aggregate number of nymphs carried to the wasp colony must have amounted to several thousand at least. The effect of this persistent raid upon the local population of spiny katydids has not been determined. Mr. Parks reported during the summer that he failed to find adults in their usual habitat, but his duties in other directions very likely did not permit a thorough investigation. Several other yucca plants in a condition equally favorable for breeding and within a radius of five miles from the apicultural station had not been utilized by the wasps. No other colony came under observation.

This preference for specific kinds of prey by predacious wasps has been established for a number of species. Experienced entomologists sometimes find it of advantage to let the wasp hunters do their collecting by relieving them of their captures when brought in to the breeding grounds.

* * * * *

Since submittal of the above note for publication additional observations on the behavior of *Chlorion harrisi* in Texas have been received from Mr. H. B. Parks as follows:

"Observations on the relationships which exist between plants and insects are always of interest. The spring of 1928 I was enabled to observe the nesting activities of *Chlorion harrisi* through a period of over three months. On the 10th of April the gardener of the Texas Agricultural Research Laboratory reported a swarm of little black bees in a 'Palma.' Investigation showed that the bees were the wasps mentioned above. Palma is the Mexican name for the Spanish Dagger (*Yucca treculeana* Carr). The dagger-like leaves of this plant serve as leaves for about two years. At this time they lose their green color and roll up so that they form a tube ranging in length from twelve to twenty-four inches. These hard dry leaves with the thorns at the end hang straight down, making a perfect protection for the plant. Incidentally this also affords a nesting place for the curved billed thrush. Every one of the tube-like leaves is a home for a wasp. Three or four females seemed to work in a single leaf. They begin nesting operations by making a plug of dead grass blades in the lower end of a tube, then several nymph grasshoppers, spiders or other insects are placed on the grass bed. An egg is placed on one of the torpid insects. A plug of dead grass is put in and another lot of insects placed until the leaf was filled. During the time when the observations were made the same leaf was the home of three generations of wasps. It was a very peculiar sight to see hundreds of these wasps each carrying a dry grass blade hovering about the Spanish Dagger plant. These wasps were very selective as to the insects with which they provisioned their nests. What one brought in all brought in. However, the species changed several times during the period. They started out with grasshopper nymphs, changed to spiders, then to grasshoppers of a different species and when the hot weather of July put an end to their work they were using the nymphs of a green cricket. The Spanish Dagger is a very common plant in the semiarid part of Texas and every plant visited this summer had its colony of wasps."

Capture of Dragonflies by Larvae of Cicindelidae—While walking across a stretch of bare ground on August 12, I saw a dragonfly held captive by something that held it from below. I got down on my knees and took hold of one of its wings and raised it carefully. It was firmly held by a cicindelid larva. Afterward, I came across several more. One dragonfly was drawn almost completely into the burrow with only its head sticking out, because it was too large to enter the opening. These cicindelid larvae have tremendous strength for their size. I tried to find out just how the larvae caught their prey, but was not lucky enough to see one in the act of making a capture.—JOHN D. RITCHIE, Earl Grey, Sask.

EDITORIAL.

ENTOMOLOGICA AMERICANA.

The first number of volume IX, the third volume to be issued since we resumed publication of this quarterly, is now out; and we take this occasion to bring several matters in connection with this publication to the attention of our BULLETIN readers, many of whom are also subscribers to our larger publication.

First, our issue has been limited to 200 copies of each number. Our subscription list absorbs 75 per cent. of these; and some few go out as sample copies, or to replace numbers not received by subscribers. The Society is reserving 25 complete sets of each volume, to be sold as such, only; the remainder will be sold either singly or as odd volumes at the current subscription price or number price. When these are exhausted, the 25 reserved sets of complete volumes will be on sale at justifiably advanced prices, and as complete sets only, as stated above. As may be readily understood from what precedes, there will be a maximum of *only* 200 complete volumes—very likely less, because of losses in the mails and for other reasons. Accordingly, all those who desire complete sets of this publication should subscribe *now;* and their orders will be filled as received at current rates, while our supply of unreserved volumes lasts. After that, the prices will be advanced.

We have, of course, the best of reasons for this—our publication is costly and is run at a loss on subscription receipts; and our run is limited for those reasons. There are on hand reprints of the articles which have so far appeared; and persons desirous of securing only certain articles should purchase them from the Society in that form. Single numbers of the publication are sold at what are deliberately intended to be prohibitive prices, to discourage the practice of purchasing single numbers instead of subscribing to whole volumes.

Our publication has four numbers to the volume. When there are very long papers, two numbers may be consolidated into one. But, in any case, our intention is to give about 240 pages to the volume, which we have done approximately so far. To give this number of pages in four issues limits us as to the length of the papers—which limitation is emphasized by the fact that we publish only one paper to the number. Hence, while papers are offered (and indeed welcomed), not all are of a suitable length; others are too expensive to publish unaided because of their many necessary illustrations; and not all have editorial approval as coming within our scope as to subject as as to ENTOMOLOGICA'S standards as to importance of the matter. This is not a question as to merits *per se,* but rather one of availability as to permanent or fundamental nature of their subjects.

This highly selective attitude makes it difficult to have on hand papers as needed; and when they do come in and are otherwise eligible for publication, we are confronted with the problem of making the publication varied, and, above all, divorced from dedicating itself exclusively to any one group; or even from having a preponderance of papers on any one Order.

Whence, in spite of our best endeavors to be prompt in our issues, we are at times held up by absence of the desirable paper; at times, even though papers be in hand, by our effort not to publish two successive numbers on the same Order. This is our explanation of delays in the appearance of our publication, which we commend to the attention of all our subscribers.

The essence of these comments is contained in these facts. Our issue is very limited; and belated subscribers will be unable to secure complete sets when they want them, and the late comers may have to pay an advanced price. Our price for single copies is deliberately high, to encourage subscription to full volumes. We are very selective in the type of articles published, hence we may have delays in the appearance of the several numbers of a volume.

And particularly, we ask all who wish to have complete files of ENTOMOLOGICA AMERICANA to subscribe at once; or to renew NOW if they already are subscribers. J. R. T.-B.

BOOK NOTES.

Medical Report of the Hamilton Rice Seventh Expedition to the Amazon, in Conjunction with the Department of Tropical Medicine of Harvard University, 1924–1925. Pp. i–xvi + 1–331, plates i–lxx, figures 1–15. (Contributions from the Harvard Institute for Tropical Biology and Medicine, no. IV. Harvard University Press, Cambridge, 1926.)

A medical treatise would seem alien to entomology, but this, in fact, in treating of tropical diseases, necessarily deals with the insect carriers of many of them. Part II of this Report, on "Medical and Economic Entomology" is by Dr. J. Bequaert, Professor of Medical Entomology at the Harvard Medical School. This in itself is assurance of the accuracy of the work.

A description of the characteristics of the region in which the insects were observed fills some eight pages. Then the Arachnoidea are discussed in another eight pages; followed by the Insecta in family groupings to the extent of some seventy pages. While the insects of medical importance are discussed in detail, all the others secured on the expedition are mentioned. The fullest treatment, naturally, is accorded to the Diptera and the Hymenoptera, Dr. Bequaert's special groups. But the other Orders are also treated quite fully, the species secured are all mentioned and discussed.

This part of the work is really a valuable ecological study of a tropical insect fauna; and really necessary to any student of biology.

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Biological Survey of the Mount Desert Region, conducted by William Procter—Part I, The Insect Fauna with Reference to the Flora and other Biological Features, by C. W. Johnson—Pp. 1–247, 1 plate. 1927. (The Wistar Institute of Anatomy and Biology, Philadelphia.)

In the Introduction to this interesting catalogue of a restricted fauna, Dr. Johnson comments on the 3384 species of insects recorded from Mount Desert Island. The Diptera contain more than 1/3 of the species mentioned, but, as Dr. Johnson remarks, this is probably because they are his chief interest. This is a very valuable paper for faunistic students.

Elementary Lessons on Insects, by James G. Needham. Pp. i–vii + 1–206, figs. 1–72 and others numbered. (Charles C. Thomas, Springfield, Illinois, $2.)

It seems quite an impertinence to pass on the finished work of Dr. Needham, whose authorship alone is sufficient guarantee of the soundness of this little book. But it is a reviewer's function—and in this case, pleasure—to bring to the notice of possible readers those books that are submitted for commentary.

Dr. Needham goes to the water for his examples and studies of the anatomy and physiology of insects—from the present writer's standpoint, the most direct approach. There is an outstanding advantage in the aquatic young of certain insects, for there is no difficulty in keeping them at all times in proper habitat conditions so that we thus secure normal insects for study under normal conditions. And further, young aquatic insects have a transparent integument, through which many of the life-processes may be observed *while the normal living insect is restrained of its motion temporarily, but without in any way deranging its functions.* Hence, through the transparent skin of the young stonefly we can see the flow of the blood and the movement of the heart; and also the regions and operation of the digestive tract, as well as the air-filled tracheae and tracheoles and the various ganglia and nerve fibres.

The aim of this book is, as Dr. Needham puts it, "Sound knowledge of the essentials of insect structure and development and habits. These are the things worth knowing." Further on, he says, "The bane of our schools is bookishness." Hence, his book, in a series of exercises, leads the student away from the book and to the study of the thing itself.

This is a small book, but it opens the way to a vast subject; and that which others would have written into the book, he enables the student to find out and write for himself—which trains the student not only in observation, but also in setting forth the observation in understandable terms.

The book naturally divides itself into four parts—Part I, Introductory; Part II, the Principal Groups of Insects; Part III, Injurious Insects and Their Control; Part IV, Collecting, Preserving and Rearing Insects. There are also thirteen lessons on topics arising from the twenty-five chapters.

Dr. Needham has to a certain extent simplified the extreme technicality of the usual work on insects, even of such as supposedly written for the inexpert (except, of course, the highly imaginative outgivings of the uninformed popularizers); but it seems as though some of these terms might have been more extensively defined and others left out.

In a sense, this book is complementary to Lutz's Field Book; and truly introductory to the elements of insect biology. It comes to fill one of the many voids in the amateur study of insects in this country. It is to be hoped that someone may have the gift, courage and enterprise to give a like treatment to the several orders of insects. J. R. T.-B.

PROCEEDINGS OF THE SOCIETY

Meeting of February 16, 1928.

held at the Brooklyn Museum, on Thursday evening, February

A regular meting of the Broklyn Entomological Society was
16, 1928, at 8.14 p. m.

President Davis in the Chair and 15 members present, *viz.:* Messrs. Bather, Bell, Beutenmuller, Bromley, Chapin, Lemmer, Leonard, Nelson, Notman, Olsen, Schaeffer, Sheridan, Shoemaker, Siepmann and Torre-Bueno, also four visitors, including Mr. Sever, an authority on European cave beetles.

Minutes of the previous meeting read and approved.

Mr. Engelhardt presented the Treasurer's report, showing a balance in account of $1,463.67, and commented on the favorable outlook for the balance of this year.

Mr. Torre-Bueno presented the report of the Publication Committee, showing that there were at this time 277 subscribers to the Bulletin and 120 subscribers to *Entomologica Americana;* he gave full details of the cost of publication, and showed that while the subscription price was only twice what it was formerly, the cost of publication was five times as much and at the same time the subscribers received three times as much for their money; he also reported that the Society had on hand salable publications to the amount of $3,450.00, made up of the copies of the Glossary, and back numbers of the Bulletin and *Entomologica Americana;* he reported that the stock of the Glossary was beginning to get low.

Mr. Engelhardt proposed for membership: Mr. George Rau, 647 Harrison Place, West New York, New Jersey.

Mr. Rau being present, it was regularly moved, seconded and carried, that the By-Laws be suspended and that the Secretary cast one ballot in favor of the election of Mr. Rau, which was accordingly done, and Mr. Rau declared to be elected to mem-
cussed,

Dr. Leonard spoke on *The European Corn-Borer in the United States,* illustrating his remarks with lantern-slides showing the life history of the insect, corn fields devastated by its attack, methods of ploughing, the necessity of clearing from the fields all parts of corn or weeds likely to contain larvae or pupae. He also showed a map of the infested areas, showing the extent of the infestation since the insect obtained its foothold in the country. He told of its introduction into the country and of the gigantic extent of the operations for its control. He said that the greatest infestation was along waterways, in regions where the soil was more or less damp, that the insect did not seem to thrive so well where the soil was of a dryer character; he also spoke of the disposition of the $10,000,000.00 fund which the Federal Government appropriated for the purpose of fighting the corn-borer, and the use of parasites in the infected areas, 1,500,000 to 1,750,000 of which have been liberated, but as yet have made little or no headway against the corn-borer. Dr. Leonard spoke of the New York State List of Insects and said that it was expected that copies would be mailed to the members of the Society during the next week. He said that a great deal of credit was due the members of the Society who contributed and that the List could not have been so successful except for the coöperation of all. Dr. Leonard's remarks were discussed by the members.

It was announced that Dr. Felt was to shortly retire from the office of State Entomologist and it was, on motion, duly approved, and the Secretary directed to write to Dr. C. C. Adams, Director of the State Museum, the expression of the respect and esteem of the members for Dr. Felt and their appreciation of his long and efficient service as State Entomologist, and that they wished to place before him the name of one of their members, Dr. M. D. Leonard, who had at one time served as Acting State Entomologist, and whom they considered as entirely eligible and qualified for the position of State Entomologist, and would like to have him considered.

Mr. Shoemaker exhibited three boxes of butterflies from Plainview and Tolland, Colorado, which were mounted with his usual care and exactness, and remarked generally about them.

Mr. Bather made a few remarks of general character.

Mr. Sever showed vials containing cave-beetles of several species.

Adjourned at 10.30 p. m.

MEETING OF MARCH 15, 1928.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum, on Thursday evening, March 15, 1928, at 8.20 p. m.

President Davis in the Chair and 15 members present, *viz.:* Messrs. Bell, Beutenmuller, Bromley, Engelhardt, Huntington, Lemmer, Nelson, Notman, Rau, Schaeffer, Schiffer, Sever, Sheridan, Siepmann and Torre-Bueno, also Mrs. Coait and another visitor.

Minutes of the previous meeting read and approved; Secretary also read a copy of his letter to Dr. Adams, of the State Museum, in accordance with the resolution passed at the February meeting of the Society, and the reply of Dr. Adams thereto.

Mr. Engelhardt presented the report of the Treasurer.

Mr. Torre-Bueno reported for the Publication Committee that *Entomologica Americana,* no. 3, was in the printer's hands, but that the April number of the BULLETIN was not yet ready for the printer on account of the great amount of work necessary in compiling the index; that the Committee thought well of the proposed New Glossary, but had decided to delay action until Mr. Engelhardt has had an opportunity to talk personally with some of the prominent entomologists, while on his trip during the spring and summer.

Mr. Engelhardt proposed for membership: Mr. Joseph Sever, 499 Manhattan Avenue, New York City.

As Mr. Sever was present, it was regularly moved, seconded and approved that the By-Laws be suspended and the Secretary cast one ballot in favor of the election of Mr. Sever; the Secretary cast the ballot as directed and Mr. Sever was declared elected.

Mr. Engelhardt called attention to the coming International Congress and said that Dr. Johanssen, Chairman of the Committee was raising funds to facilitate the attendance of the visiting foreign entomologists by helping to pay part of their expenses, not over $200.00 each, and was asking donations from the various Societies, and that though the Treasurer's report indicated a prosperous condition of the Society, there would be many bills to pay during the year, but he thought that the Society should do its part in helping out the programme, and moved that it make a donation of $100.00 to the fund being raised. Mr. Torre-Bueno suggested that perhaps the members would like to contribute personally, and Mr. Davis called attention to the meeting in December of the American Association for the Advancement of Science to which the Society will be expected to contribute. Mr. Engelhardt's motion was regularly seconded and approved.

Mr. Davis read a short paper, which will be published in the BULLETIN, on *Lucilia australis Townsend anticipating death,* and exhibited specimens of that fly.

Mr. Engelhardt said that he had recently been in Pittsburgh and had found Dr. Holland there engaged upon a revision of the Butterfly-Book; he found Dr. Holland very keen and active and he asked Mr. Engelhardt to convey his greeting to the members of the Society; Mr. Engelhardt commented on the fine state of the collection in the Carnegie Museum.

Mr. Torre-Bueno spoke *On Popular Books on Entomology, with Examples,* and said that these books might be divided into two classes, those that were written by authors who knew what they were writing about, and the others by those who did not, and illustrated his remarks with various books on Entomological subjects. Mr. Torre-Bueno's remarks were discussed at length by the members and visitors.

Mr. Beutenmuller spoke on *A New Gall-fly from Woodlawn, N. Y. City,* and exhibited specimens of the fly and the galls; he told of his first finding the galls and his efforts for the past ten years to breed the fly from them, each year, for several years, those that he found were kept in the house during the winter and failed to emerge; he at last discovered that by keeping them out of doors practically all winter the larvae would survive and by this method succeeded in raising the adult fly; he also said that it takes two years for the larva to mature; he intends to describe the species as new to science.

Another general discussion followed on popular books on Entomology.

Adjourned at 10.15 p. m.

E. L. Bell,
Secretary.

Meeting of April 12, 1928.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum, on Thursday evening, April 12, 1928, at 8.15 p. m., Vice-President Torre-Bueno in the Chair and 10 members present, *viz.:* Messrs. Bromley, Notman, Chapin, Rau, Shoemaker, Schaeffer, Schiffer, Sever, Sheridan and Torre-Bueno, also two visitors, Mr. Pollard and Mr. Willis.

In the absence of the Secretary, Mr. Pollard was appointed Secretary *pro tem.*

Minutes of the preceding meeting were read and approved.

The Vice-President reported progress on behalf of the Treasurer. For the Publication Committee he reported that No. 3 of *Entomologica Americana* had been distributed, and that the subscription list now numbers 125, the edition consisting of 200 copies. The BULLETIN, he stated, would be issued in April. Upon motion, the report was approved.

Mr. Sheridan proposed the name of Mr. W. J. Willis, Room 407, 30 East 42d Street, Manhattan, for membership. Upon motion, the By-Laws were suspended and the Secretary was directed to cast one ballot for Mr. Willis, which being done, Mr. Willis was declared duly elected.

Mr. Sheridan moved that the Society tender to President Davis its sympathy for his recent bereavement. This motion being adopted, Messrs. Sheridan and Schaeffer were appointed by the Chair as a committee to draft a suitable resolution, which was offered as follows and adopted unanimously:

Resolution adopted at a meeting of the Brooklyn Entomological Society held April 12, 1928.

WHEREAS, The members of this Society have learned with great sorrow of the death of Mrs. Davis, the beloved mother of our President, William T. Davis; and,

WHEREAS, On hearing of this sad occurrence, this Society determined to go into committee of the whole; therefore, be it

Resolved, That all the members of the Brooklyn Entomological Society present to our esteemed friend Mr. Davis our most heartfelt and affectionate sympathy in his great loss, and our earnest hope that the good God may comfort our dear friend in his sorrow.

JOHN M. SHERIDAN,
CHARLES SCHAEFFER,
Committee.

Mr. Chapin exhibited a number of beetles taken April 8 near Paterson and Hackensack, N. J.

Mr. Notman spoke on *Coleoptera from the Owens Valley, California.* He showed a number of stereopticon views of scenes along the route which he followed through the Owens Valley and Lone Pine Canyon, and exhibited many specimens. Most of the collecting was done at high elevations, and special attention was paid to the genus *Bembidium.*

Mr. Bromley commented on the absence of Tenebrionids in the collection, and referred to the great number of *Eleodes* in the San Joaquin Valley. Mr. Notman said that they did not seem to be abundant in the region he traversed.

Mr. Bromley spoke on *Adaptation and Specialization in the Robber Flies.* He stated that the Asilidae are one of the largest families of Diptera, about 3,000 species having been described. All are predaceous. He remarked that the most plausible explanation of the resemblance of these flies to bees and wasps was that it is protective and has come about through natural selection. In *Romachus,* a world-wide genus, the primitive, slender-bodied type is found in some species, but others tend to become shorter and stouter-bodied, with a closer resemblance to bees. Adaptation has progressed so far in the closely related genus *Mallophora* that our species simulates the worker of *Bombus americanorum,* while another species resembles the queen of the same bee. In general the slender species tend to simulate the wasps, some even having the coarctate abdomen. One fly imitating a species of *Pepsis* in its blue-black color, has the forelegs orange colored like the antennae of *Pepsis,* and in flight holds these legs straight forward. A species of *Hyperichia* in Africa resembles a Xylocopid bee, which it feeds upon, while its larvae feed upon the larvae of the same bee. The largest known robber fly is one from Madagascar. The hind tarsi in the males of some species exhibit various modifications, which Mr. Bromley believed to be secondary sexual characters.

Upon motion the Society adjourned at 10.15 p. m.

Charles L. Pollard,
Secretary pro tem.

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